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NEWSPAPER

CW Photos by V.J. Farmer

Raytheon's mini controls mini train, illustrating the applications emphasis of exhibits at last week's NCC.

DP Users Group Advocated With 'No Strings' Backing

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—The establishment of a Computer Users Association was proposed here last week and backed up with a hard cash offer "with no strings attached" to help in the formative period.

The Computer Industry Association proposed the establishment of the group as a voice for the user on important questions affecting the entire computer community, and the association promised to give the group $50,000 in seed money for its early operation if users get together and help raise other backing.

The entire computer community—users and industry alike—faces serious problems today in the areas of standards, data security and privacy, and communications regulations, A.G.W. Biddle, CIA executive director, said.

These problems, he indicated, could only be overcome effectively through the joint efforts of the computer industry and the computer users served by that industry.

But, while the industry has strong resources and representation for its views through the individual manufacturers or groups such as the CIA, "who speaks for the user?" he asked.

Presently, he said, there is no strong unified user voice on these issues, even though they will greatly affect a user's mode of operation in the future.

Standards can significantly aid users, he indicated, by making them less machine-dependent, but to date there has been little user input to the major standard-making bodies except from the government, since representation on such bodies requires a great deal of money and manpower.

In the area of communications regulation, the users voice is likewise almost inaudible, CIA President Dan McGurk noted, due to the expense of filing petitions before the Federal Communications Commission which passes on such matters.

In this area, the FCC needs input from

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Ford, Glaser Toss Privacy, Professional Challenge to User

• 'Strengthen Skills'

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—The ability of computer users to undertake "more ambitious projects and thereby to solve more complex problems is limited by our ability to muster an adequate force of skilled manpower," George Glaser declared last week in a keynote speech to the 1974 National Computer Conference here.

While all indications show the computer industry is "doing a land-office business," Glaser, president of the American Federation of Information Processing Societies (Afips), said, users and industry alike should be uneasy "about the quality and quantity of professionals who practice the somewhat arcane arts of information processing."

Too many people in the business have been machine-oriented, or "to be less kind, we have been machine-mesmerized," Glaser said, even while personnel salary costs consume nearly 50% of the budget in most installations.

"In spite of our acknowledged technological progress, it now takes more—not less—skill to design a system, to get it on the air and to keep it running smoothly," he noted.

All of these new technical specialities "are emerging at a rate threatening the ability of our educational institutions—and our vendors—to train those who would understand and apply them," he added.

"And the skills needed to manage this cauldron of complexity continue to elude all but the most agile of mind, strong of will, fleet of foot and fat of budget," he continued.

Glaser said the computer community today finds itself in the following position:

- "There is a distressingly large num-

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• 'Consider Fallout'

By Edie Holmes
Of the CW Staff

CHICAGO—Vice-President Gerald R. Ford said last week that federal protection of individual privacy is not yet sufficiently developed to prevent use of a proposed massive computer network to "probe into the lives of individuals."

"I am aware that the notion of leaving the protection of individual privacy to government officials has been compared to asking the fox to protect the chicken coop," Ford said.

In part to prevent the government from becoming the fox, the Vice-President asked that industry, citizens' groups, individuals, academic experts and some federal agencies not represented on the committee all contribute input to the effort. In particular, he invited the NCC's sponsor, the American Federation of Information Processing Societies, and all its constituent groups to become involved.

As chairman of the Domestic Council Committee on the Right of Privacy, Ford is concerned that the proposed Fednet system may be instituted without some statement of its impact on privacy. The system would link federal agencies and allow the General Services Administration access to personal information from many federal department files.

Vice President Gerald R. Ford

In a special address at the National Computer Conference, Ford pointed out, "Before building a nuclear reactor, we design the safeguards for its use. We require environmental impact statements specifying the anticipated effect of the reactor's operation on the environment." Therefore "prior to approving a vast computer network affecting personal lives, we must consider the fallout hazards of Fednet to traditional freedoms."

. . . A Better Idea

The Vice-President reported that the privacy committee staff has begun a project to develop recommendations for assuring that personal privacy rights are given "systematic and careful consideration in the planning, coordination and procurement of federal data processing

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Exhibits Up, Attendance Down

Record Sessions Captivate NCC Visitors

By Edward J. Bride
Of the CW Staff

CHICAGO—There won't be another one for a year! That was the breathless feeling detected among many of the attendees at last week's National Computer Conference and Exposition (NCC), the biggest computer exhibit ever held under one roof.

However, while the booths flourished, attendance was disappointing; late figures showed a total of 26,000—down from last year's 32,643—came to this first national show in the Midwest.

Officials of the American Federation of Information Processing Societies (Afips), sponsors of the show, said privately that although the official before-the-fact attendance estimation was 35,000, they had been anticipating between 37,000 and 40,000.

The biggest decline was in guests invited by visiting companies: 8,700 this year as opposed to 14,945 for the first NCC in 1973, a drop of some 40%.

There was, however, a healthy increase in "full conference" or technical session attendance from 2,511 to 3,496; total paid attendance, e.g., one-day sessions, exhibits and students was down from 10,523 to 9,173.

And in the technical sessions, more emphasis was placed on user considerations. Practical, rather than emotional discussions of social issues such as privacy typified the meetings.

Perhaps refreshingly, Afips has announced a move away from its recent overemphasis on numbers and record breakers.

Donald Meier, NCC 1975 chairman, promised not to try to beat this year's

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Floor 'Reflects People's Needs'

By Vic Farmer
and Ronald A. Frank
Of the CW Staff

CHICAGO—When it comes to computer equipment shows, there have been few to beat last week's National Computer Conference and Exposition which impressed attendees with its size and colorful exhibits.

While there were no technical breakthroughs at this first Afips foray into the Midwest, applications-oriented equipment abounded for users who came to "kick the tires" or search for specific solutions.

In fact, the theme of many booths was embodied in IBM's exhibit—the first one viewed as attendees entered spacious McCormick Place.

IBM's whole approach, as a slide presentation stressed, was "reflecting users' needs." Xerox and other companies also emphasized applications rather than state-

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Fednet Worries Ford Committee

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and data communications systems." Target date for formulating an action plan is June 30.

While concerned with the Fednet issue, the privacy committee has assigned task forces to work on several other computer and privacy problems as well, according to Ford.

Privacy questions involving Social Security Numbers, personal interests of consumers, personal records used for statistical and research purposes, mailing-list practices of the Federal Government, means for apprising people of their rights with respect to information they are asked to provide federal agencies, and legislative proposals aimed at protecting the privacy interests of individuals on whom federal records are maintained are all under study, Ford said.

By researching and commenting on these questions, he noted, the committee hopes to address such related issues as development of basic legal concepts for articulating privacy rights, confidentiality of personal tax returns, privacy rights of federal employees, identification of personal information that should not be collected, administrative procedures facilitating individual knowledge and correction of errors in data files maintained by federal agencies, and limitations on the range and volume of personal data collected by the Federal Government.

"I know there have been previous commitments, previous studies and previous recommendations to deal with privacy problems by legislation," Ford said. "But too many findings have been ignored and too little actually done. The time has come for action."

When first appointed to chair the privacy committee, Ford received complaints about an executive order permitting the Department of Agriculture to review farmers' income tax returns for statistical data. Asked by the President to look into the matter, Ford determined, following a study, that the order should be rescinded. The President accepted his recommendation.

Privacy?

The Secret Service agents assigned to guard Vice-President Gerald Ford suggested to Afips that it provide them a list of every reporter covering the Vice-President's privacy speech here—including the reporter's Social Security Number, birthdate and complete job record. Afips "overlooked" the Secret Service "suggestion."

CDC Displays Mainframe—IBM's

Control Data showed its expertise in the independent peripherals area running disks, tapes, printers and memories off an IBM 370/155 mainframe in one of the show's largest exhibits.

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Economy of Operation Key Consideration in On-Line Programming

PRINCETON, N.J.—The cost factors involved in installing and operating an online system for program development should be carefully weighed before a firm commitment is made, according to ADR, the Princeton-based software house. The cost of remote terminal devices and T/C controllers may be insignificant when compared to the costs associated with installing and integrating the software into a particular environment and operating it for many hours each day. These combined expenses may far exceed monetary savings resulting from improved turnaround and increased programmer productivity.

A careful analysis should be made of additional resources—larger CPU, more core, more direct access devices—that may be required to maintain an acceptable level of batch production during the hours that the on-line programming system is in operation. Dedicating an entire CPU to program development as is commonly done with TSO or VM is an alternative, but a very expensive alternative, to running both production and development work concurrently on the same machine. Ideally, a remote programming system should operate effectively in a multijob environment, maintaining a high degree of terminal responsiveness without degrading background operations or reducing overall system throughput.

Roscoe Cost Effectiva

ADR suggests that its conversational text editing RJE system, ROSCOE, meets cost-effectiveness criteria better than comparable IBM-supplied software. ROSCOE provides versatile services to applications and systems programmers as well as to operations, design, and clarical personnel. The system contains data entry and editing facilities, compressed library storage services, and remote job entry and output retrieval functions. Also included are syntax checkers for COBOL, FORTRAN, PL/1 and the Job Control Language (JCL). A unique capability of ROSCOE is its command procedure language which supports terminal I/O operations, and includes decision making, branching, and iterative types of instructions. ROSCOE command procedures are commonly used for job stream generation and prompting (or training) of clerical personnel.

To increase the versatility of the system, ROSCOE monitor services allow an installation to interface auxiliary programs with ROSCOE for on-line execution in a conversational mode. ADR supplies with ROSCOE a limited number of auxiliary programs, including a UTILITY subsystem which provides OS data set management services to systems programmers.

ROSCOE will operate on S/360-40 and S/370-135 CPUs and larger under OS MFT and MVT with or without HASP, or with VS1 and VS2. It supports a variety of remote terminals including 2741, 2260, 3270 and teletypes of all speeds.

Tha system is generated to the user's specifications and installed by ADR personnel. The installation generally takes about one hour and is followed by classroom training of systems personnel and applications programmers. User guides and detailed system operation manuals are provided; source code is available on request.

The system is available under monthly or permanent licenses which incorporate a 30-day no-obligation acceptance period. ROSCOE is currently installed at 27 sites in the U.S., Canada, and abroad. ADR reports that 15 additional installations are scheduled for the second quarter of 1974.

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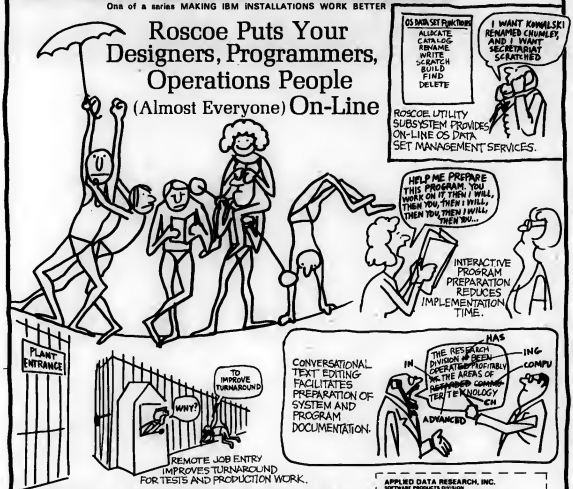

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ROSCOE In Use At VS Sites

PRINCETON, N.J.—Almost half of the existing ROSCOE installations are using one of IBM's virtual storage operating systems, according to ADR, manufacturer of the remote programming package. The most common environment for ROSCOE is an S/370-145 CPU with 512K of main memory operating under VS1. These installations generally have 3330 disc drives and local 3270 display stations. Users report that terminal response time is consistently good, and background batch processing is not noticeably affected by operation of the online programming system. One of these VS1 installations recently upgraded to VS2, and ROSCOE was successfully transferred to the new environment. According to ADR, several additional VS2 installations of ROSCOE are scheduled for the second quarter of 1974.

Oparatas Entirely in Virtual

In a VS1 or VS2 environment ROSCOE operates entirely in virtual storage under control of the VS paging supervisor, usually in a virtual region or partition of 120K. In an OS MFT or MVT environment a minimum 80K main memory partition or region is required. In most cases, installations can change from one operating environment to another without regenerating ROSCOE.

Utility Aids OS Data Set Maintenance

PRINCETON, N.J.—A major new facility has been added to ROSCOE, ADR's conversational programming system. The new capability, called The UTILITY Subsystem, provides on-line OS data set management services to systems programmers responsible for the maintenance of OS and its direct access resources. Working from a ROSCOE remote terminal, a systems programmer can now allocate, catalog, rename, write and scratch data sets; he can also build, find and delete entries in the OS catalog. All operations are password-protected, allowing access by authorized personnel only. The data management functions provided by the ROSCOE UTILITY Subsystem are comparable to those provided by TSO and the IBM batch utility programs.

Runs Undar Monitor

The UTILITY Subsystem operates under the ROSCOE monitor and requires about 25K of real or virtual storage. It can be used with other auxiliary programs serviced by the ROSCOE monitor, including ADR-supplied syntax checkers or special purpose programs prepared by the user installation. Tha UTILITY Subsystem and other monitor programs are supplied as a standard part of the ROSCOE package.

Afips President George Glaser

CW Photos by V.J. Farmer

Keynote address draws large crowd.

Glaser Stresses Need to Improve DP Professionalism

(Continued from Page 1)

ber of poorly qualified people at all levels, and particularly in user development organizations.

- "Those who are now competent are becoming less so every day as technological developments continue at an overwhelming rate.
- "The long-term career prospects for data processing people in most user organizations are not sufficiently promising to attract the talented young men and women who could add to and strengthen our supply of available professional manpower.
- "Our universities are turning out far too few computer-oriented problem solvers.
- "We are having a painfully difficult time achieving the level of professional maturity that would help stimulate and reward the continued self-renewal of individual competence."

This people problem in the industry is plunging the computer community "into an energy crisis of our own. We are building and installing powerful machinery for which we already have an inadequate supply of its most important fuel element—the talents of our people—and we are doing far too little to maintain and replenish that supply," Glaser warned.

Filling the Void

It would be unwise to dismiss critics of the quality of the people in the computer community, Glaser indicated, declaring that "our industry as a whole must, in conscience, suffer some pangs over its inability to design and build efficient and reliable software."

The mushrooming growth of the industry has been one reason incompetent people have been carried along with the more competent, he indicated. But even the most competent have problems keeping pace with technological developments, he added.

"Our technology continues to develop at a rate that defies our ability to keep up with it and, as a result, those who are now competent will inevitably become less so," the Afips president stated.

This phenomenon—known as technological obsolescence—is "endemic among our ranks," he added. "We are becoming, to bend an old Pennsylvania Dutch phrase, too fast old, too soon dumb."

When an individual becomes technically obsolete before retirement it is a problem not only for him, but also for his organization and "those whom his organization serves: customers, stockholders and the general public," he added. And as the computer becomes increasingly vital to the functioning of our economic system, the technological obsolescence of computer professionals becomes a national problem, Glaser said.

Today the computer community spends "substantially less than 1%" of its overall budget to train those very professionals on which it depends—less than $700 for every professional in the field, he noted.

Another major problem, Glaser said, involves the career prospects in the computer-using community, since people choose jobs first because they are considered challenging or fun, and secondly for the career opportunities in the area.

While the computer profession is considered either challenging or fun by most of the business, Glaser said he had "some misgivings" about the potential careers of aspiring programmers.

Can the Cream Rise?

He noted that today the DP manager is not usually in a position to move into the higher ranks of top management even though in the past, rosy predictions had been made regarding that potential.

"I've been troubled for some time by what I believe is a lack of political clout among those DP managers whose outlook is perceived to be—and often is—too narrow," Glaser stated.

"Perhaps this is so because they have necessarily had to focus their energies on managing a difficult and challenging technical specialty," he said, indicating this may have left many DP managers little time to study broader management subjects.

But for whatever reason, he said, DP managers had little opportunity to participate in the "tough decisions" most companies face, and therefore "retain their image as narrow specialists unless they make a concerted personal effort to redirect their careers."

On the education scene, Glaser noted that while computer education has improved at the college and university level, those courses are still not turning out "hard-headed pragmatists" needed to apply computer technology successfully to the real world.

"What we desperately need are professional problem solvers, trained to practice computing," Glaser said, noting that unless this capability is developed, "we shall continue to turn out individuals for whom the 'agent of change' role is extremely painful and frustrating."

Growing Pains

The industry has also had a "painfully difficult" time in reaching a level of professional maturity, he said, largely because in the past, members of the computing profession have spent more time "talking about professionalism than we do acting like professionals."

"Professionals," he said, "help people. They do not worship things. Yet it seems to me that far too many computer people are unduly impressed with their machines. And the more zealous of them act as though the use of the computer were inevitably good, whereas its use often can be questionable, or even precarious."

While most professions develop over a "long road to maturity," the computer profession "developed rapidly," he said, which has permitted little time "to develop that fullness of understanding in its environment on which professional maturing must rest."

To gain professional maturity the computer community needs to start with an understanding of user problems and the view that computers are just tools in overcoming those problems, he said. "But always with the idea of helping people and not, per se, advancing computers."

The profession also needs to show the positive benefits of its activities, he said, noting that a critical auditing of the results of the profession should be encouraged.

"Unfortunately, neither maturity nor humility have been hallmarks of our trade. . . . It took courage—even brashness—to create a major industry from scratch in only 30 years. But we are upstarts, and we often cause feelings of apprehension and even resentment," Glaser noted.

Whatever the solutions to the problems may be, he noted, "they must flow from all of us—from leaders of our industry, from those of us who aspire to be labeled computer professionals, from concerned user management and certainly from those societies and professional groups which speak for a significant portion of our field."

"And respect will come more readily if we can demonstrate our ability to deliver solid, workable solutions to important and real problems," he concluded.

CIA Promises User Group Support

(Continued from Page 1)

the computer community, particularly the users, on their future needs for service, he added, because the FCC itself is not a reservoir of computer expertise.

In the area of data security and privacy, Biddle indicated the users voice has not been heard, even though any new regulations, such as those currently proposed in Congress and in state legislatures, will greatly affect their operations.

In all three of these areas—as well as several others—there is a need for a neutral body made up of industry representatives, user representatives and government agencies to help determine the most effective solutions from both the technical and policy viewpoint, he said.

The proposed organization would not compete with such groups as the Data Processing Management Association or the Association for Computing Machinery or any of the professional societies already in existence, Biddle suggested.

It should be made up of high level executives in using organizations, he suggested, who have overall management responsibility for data processing in their companies and who have responsibility for planning and directing the computer effort of the companies.

While the CIA executives said their promise of support would have no strings, they did lay down two conditions that would have to be met by the organizers of the new group before the money would be forthcoming.

First, they said the organizers would have to get support from two other sources in an amount equal to the CIA contribution, $50,000 each from two bodies.

An organization such as the proposed Computer Users Association would have to have a sizable budget, Biddle explained, in order to be the force in the industry it should be. Thus he feels $150,000 would be necessary for the initial organization period.

In addition, the CIA said, a "reasonable" number of important computer users would have to sign up to join the group and to work out a plan of action and propose by-laws for the new body.

The CIA executives said they would like to see the new group formed as soon as possible and they hoped important users would take up the challenge of forming an organization to represent their needs on the important issues facing the computer community.

Sessions Captivate NCC Visitors

(Continued from Page 1)

record of 119 technical sessions.

Nonetheless, with a special emphasis on selling exhibit space to foreign companies, another new high in booth spaces could be achieved next year.

The 815 booths (there was one last-minute cancellation) was only 10% shy of a "record"; the only time there were more booths was during the 1969 Fall Joint Computer Conference, when the exhibit was split into two locations.

Keynote Sparks Interest

Reaction to special programs and speeches was naturally varied. The address by Vice-President Gerald Ford marked a first, but one of the more surprising aspects of the speaking program to some attendees was the number of people who came to hear the keynote address.

In the past, Afips had tried to procure a "big-name" speaker to deliver the keynote address but failing with major political candidates from both parties, they looked inward. And the reception the 1,600 listeners gave to George Glaser, Afips president, was one of the most enthusiastic of any conference keynoter in recent memory, as he enumerated professional responsibilities and the need to bolster the computer industry's education and training programs.

While many points in the lecture were not entirely new, attendees said they liked his refreshing terminology, sense of logic and conviction; the "arena" was proper, too, as ensuing sessions focused on deficiencies in DP education, professionalism and career paths for DP people.

Afips is expected to make copies of his presidential address available shortly.

Overall, session panelists and exhibitors alike were optimistic about the growth potential of the industry, barring unforeseen circumstances such as a worsening of the energy situation or a genuine recession. If the optimism proves correct, they may just be talking "records" again for the 1975 meeting.

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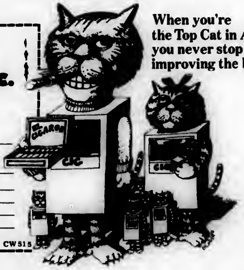

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CW 515

Williams

Kaellner

Ybaben

Ware

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Don't Treat Symptoms and Symbols, Panel Declares

Definition of Privacy Needed Before Action Can Start

By Edward J. Bride
Of the CW Staff

CHICAGO—The problem surrounding the computer's role in invading personal privacy begins with identifying privacy. Until that happens, efforts in building safeguards into data systems will consist of treating symptoms and symbols, rather than the problem itself, panelists at a special NCC session agreed.

"The little man will not risk a lawsuit" when he has been harmed by inaccurate or erroneous data, unless there is an excellent chance to win that suit, according to Dr. C.G. Kaellner, chairman of Sweden's new Data Inspection Board (DIB).

Commenting on suggestions that the judicial system should resolve privacy problems, Kaellner noted the DIB investigates problems without cost and can force operational changes in databanks. If a citizen wants to collect penalties or send a wrongdoer to jail, then he must resort to the courts, Kaellner noted.

Session chairman Dr. Willis Ware, who also chaired the 1972-73 HEW study into computers and privacy, proposed that several libertarian characteristics be forced on holders of data banks; these would include correction of errors and updating files, as well as the right of a person to know the uses of the data being collected.

Ware's "straw-man" proposal, as he called it, reflected most of the HEW committee's recommendations. However, he would also require that a citizen inquire whether he is a subject of a data file, placing the initiative on the subject. This would alleviate the task of notifying individuals, a large clerical task that could bottleneck the Postal Service, he suggested.

Ware did indicate, however, that a central repository, listing the data banks that do exist, might be a way to get around the notification problem.

'Only One Third?!'

Raised eyebrows and whispered notes of surprise characterized the audience reaction when an official of one of the largest credit reporting agencies said "only one third" of contested records were inaccurate.

Ray Ybaben recalled that before the Fair Credit Reporting Act (FCRA) was passed three years ago, his agency [TRW Credit Data, Anaheim, Calif.] received fewer than 2,000 consumer inquiries in a year's time.

But with the requirement that a person be notified when he is refused credit because of a negative report, which he can then contest, the inquiries increased a hundred-fold.

TRW now receives 200,000 inquiries a year and this places an extreme burden on his personnel and on the computer system, he said. And "only one third" resulted in the correction of an error, he said.

Ybaben believes that only 1/20 of the people who have been turned down have actually contacted TRW to find out why.

The impact of the FCRA on TRW has been significant, he added. A new internal department deals strictly with legislative considerations; new training had to be accomplished with TRW's internal auditing staff; expanded quality control had to be implemented in order to assure "reasonable accuracy"; there is a high amount of file maintenance on the system; and now, attempts are being made to automate each "consumer contact," if printouts can be translated into "plain language."

He also claimed each consumer contact costs an average of $8 because each claim of inaccuracy must be investigated; this cost, of course, is passed on to TRW's clients and then, ultimately, to the consumer as the cost of credit, he indicated.

Overreaction?

Richard G. Mills, vice-president of First National City Bank in New York, called on the legal and computer communities to slow down the efforts to pass new laws.

Too often, reaction to privacy problems is "unreasoned and hysterical . . . let's not be stampeded," he said.

Noting a broad definition of personal information contained in some of the pending bills, Mills claimed the payments mechanism of banks nationwide would come to a stop the day such bills as the Koch/Goldwater proposal went into effect.

He noted a check contains personal information and is passed among several organizations in order to effect a funds transfer.

Dr. E.B. Williams, vice-president of Educational Testing Service, said most proposals in the privacy arena would have little or no affect on ETS' operations.

He observed, however, that educational institutions which ETS serves would have problems if they were prohibited from using the Social Security Number as a file access number, since most colleges are involved in federal and state grant programs and must report information to many federal agencies, including the IRS.

Williams also disagreed with Sweden's Kaellner, noting it is easier now to bring a suit of "major proportions" if a person qualifies under certain poverty provisions.

Amplifying his introductory remarks, Williams said ETS does not use the SSN as an identifier.

As the discussion turned to the appropriateness of the SSN, Mills commented it was only a "symbol" of the fight for privacy, and that restricting use of the SSN is not the solution. The solution is reducing the transfer or linking of files, Ware agreed.

IBM Security Study Presentation Shows Problem Remains, Little Progress Made

By Edward J. Bride
Of the CW Staff

CHICAGO—What's new in data security? About 1,000 attendees at the IBM security session heard representatives from four user sites say, essentially, that security continues to be a "big problem."

And C. Larry Foster, project manager for IBM's Data Security Studies, said little new has emerged in the year since the "interim" report was given at last year's NCC.

But if one trend can be spotted in the various reports, it is the advice that users should stop thinking and planning for 100% secure systems, and plan only for the amount of data security they need.

In other words, the computer industry is not going to solve the security problem; users must assess their own risks and the costs they are willing to take in order to protect themselves, Foster indicated.

The results obtained so far will be available from IBM branch offices in hard-copy form this summer, perhaps as early as July, Foster indicated.

The six-volume study will also include an executive overview by IBM. The two-year effort has cost IBM some $2 million of the $40 million allocated to solving—or at least identifying—the data security problem.

IBM also indicated it would encourage a continuing dialogue on the subject by sponsoring two conferences later this year; participants will include both commercial and government users.

Short on Detail

There were few specifics in the individual user reports, other than reconfirming that IBM's experimental Resource Security System (RSS) has over 100 "holes."

In discussing the MIT portion of the study, Robert H. Scott said the institute modified the RSS procedure that allowed only a security officer to decide who can use or alter a particular set of data; the procedure also required that his decision be made well in advance of actual operation.

In the MIT experiment, the creator of a data set could authorize others to use the information in ways such as read-only, copy, modify or destroy.

In taking the less restrictive approach, MIT avoided the time-consuming problem of having to go to the security officer for each change in authorization, Scott noted.

MIT was thus able to install and use a secure system in a previously insecure time-sharing operation with a large number of users and constantly changing relationships between users and data.

The report from TRW, Inc. included a list of 187 requirements for data security, and Gerald E. Short said RSS failed to meet 94—almost exactly half of them.

The list could be used as a general checklist to determine whether a system is acceptably secure, he noted.

Power to the Owner

The IBM site, the Federal Systems Center in Gaithersburg, Md., concluded owners of data should have the power to authorize access to their data, Lee N. Danner of IBM's System Development Division (which managed the project), related.

He saw a need for special identification procedures for regularly scheduled jobs where operators or other production people—rather than the programmer or end user—have the primary, direct access to the computer.

In such cases, FSC found names and code words inadequate for checking identification; better alternatives should be considered, Danner continued, such as comparing the time a job is submitted against a "master schedule."

If, for example, payroll is normally run at 2:30 p.m. Friday and there is a request to run at midnight Tuesday, something is wrong, he noted.

The State of Illinois included some privacy considerations in its area, and worked with two other government groups to produce some sample legislation, said Robert T. Caravella, who represented the state although he has since moved to the Federal Trade Commission.

The other groups are the National Association for State Information Systems (Nasis) and Government Management Information Sciences (GMIS); the "legislation" is included in Illinois' portion of the report, and limited copies of this segment are available from the state's Management Information Division in Springfield.

Illinois also produced video tapes (to be available from IBM branch offices) on several security-related issues, such as the problem of "whose right to know," executive overviews, designing and implementing software and access methods, and physical security and backup.

Chicago Chuckles

The Chicago Fire of "way back when" is kept warm by several local reminders: cab drivers always point out the Water Tower, the only structure left standing in downtown Chicago after the fire; the new professional tennis team will be the Chicago Fire; and the discoteque on top of McCormick Inn, the Afips headquarters hotel (and press hotel), was labeled the "Fyr Station."

The old McCormick Place, incidentally, burned to the ground over a decade ago, leading to the construction of the spacious new facility, well-protected by a modern fire-fighting system.

'People-Oriented' Data Systems Need Timely Definition, Research

CHICAGO—Efforts are being made both to define the requirements for "humanized" information systems and to promote research in relevant areas, speakers emphasized at the session on humanization of information systems sponsored by the ACM Special Interest Group on Computers and Society (SigCAS).

A group of individuals interested in the problem of making computer systems more acceptable to humans retreated last summer and devised some criteria for systems, Calvin C. Gottlieb of the University of Toronto said.

They decided the computer industry should develop easily understood languages and procedures containing courteous transactions that are not rude and unfamiliar, according to Gottlieb.

In addition, there should be "a reasonable response time"—fast when possible—but within the limits of what a user expects, such as a month for a billing cycle.

There also should be messages to acknowledge receipt of input from the user or billing customer when there is a delay.

The fourth requirement, and a very important one, Gottlieb noted, is that there be "an escape to human interface mode" to provide for exceptions.

"I think this is an absolute essential of an automatic system," he said. Alternatives and exceptions should also be provided to the user, such as the option of not having his name released to various mailing lists.

In the area of confidentiality, several groups are advocating allowance of inspection, plus challenge and change of data by individuals, he observed. While he agrees institutions with data banks should be required to make known the existence and type of data stored, Gottlieb said he thinks it depends on the type of data bank as to how much access should be allowed.

He offered several guidelines for systems design, "some of which are so obvious it's almost embarrassing to have to mention them."

Systems should not have tricks or deceptions and should assist participants rather than manipulate them, he noted. For instance, if payment for one month is not received, the system should not arbitrarily shorten the 30-day payment period of the following month without notifying the consumer.

Payment mechanisms should be explained clearly to the consumer rather than making it seem advantageous to make a small payment when, in fact, there are drawbacks to doing so.

Systems should allow for human requirements along with the assignment of a person responsible for humanizing aspects of the system, Gottlieb said.

This position would be more than the ombudsman position of smoothing things out after there is a pile of correspondence between the grieved payee and the billing department.

Funding for developments specifically in the area of systems humanization has not been extensive, largely because the problem is only now being defined, observed M. Granger Morgan of the National Science Foundation (NSF).

However, Morgan cited several projects under NSF funding that pertain to some element of facilitating man-machine interfaces. Current research delves into the areas of improved interface systems, communications with complex software, human-to-human communication and education communication services for handicapped, he said.

A group at MIT is working on sketch-recognition and machine inference and related computer aids to architecture.

In the area of communication with complex software systems, a project at Purdue is attempting to develop a "front end" that allows nontechnical users to interract with and update a large data base in this type of language.

For the "back end" of a system, work is being done in San Diego to enable citizens to interpret and apply citizen value ratings to policy models.

Victor Bunderson of Brigham Young University described several goals of the Ticket education system being built by BYU and Mitre Corp.

The object is to avoid making the student a captive. Rather the system is designed to permit development of an improved strategy for learning, giving a chance to develop an attitude of approach rather than avoidance to math and English, the two subjects that will be taught through computer-assisted instruction at a community college.

'Gee Whiz Dad, It's a Wurlitzer'

Calcomp demonstrated its automated tape library system, which delivers and mounts tapes automatically as needed on the firm's tape drives.

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Communications Products On Display Feature Enhancements Over New Technology

By Ronald A. Frank and Patrick Ward
Of the CW Staff

CHICAGO—As has been the case for the past two or three years, most of the communications products exhibited at the NCC were enhancements to previously announced terminal-based systems. One of the most innovative devices was the Data Compactor introduced by Data 100 Corp. and designed for use with the firm's remote batch terminals.

CW Photo by R. Frank

Richard Enderle of Data 100 demonstrates firm's Data Compactor.

The compactor is connected between the terminal and its associated data set on the remote end, and between the front end and its data set at the main site. It accepts data at speeds higher than the rated transmission capability of the line.

As a result, the compacter is said to allow a 2,400-bit/sec line to operate at an effective rate of 4,800 bit/sec, while lines normally operating at 4,800 bit/sec can be improved to an effective 9,600 bit/sec throughput.

The compactor must be used in pairs much like a data set, with one unit at each end of a data link. It can be used on both two-wire and four-wire circuits operating on either dial-up or private lines. The device comes in two versions with the Model I used for 2,000- to 4,800 bit/sec data sets and the Model II used for 4,800- to 9,600 bit/sec data sets.

The device is designed primarily to increase the throughput capacity of Data 100 terminals operating in binary synchronous mode, but it can be bypassed for use with other line disciplines, the company said. In addition to increasing throughput, the compactor is said to enhance security and reduce line errors.

According to a company spokesman, the device is significant because the new data compaction scheme is superior to previously employed data compression techniques.

Initial deliveries of the compactor are scheduled for June.

The unit will cost $2,730 and $6,300 for Models I and II, with two-year lease prices set at $150/mo and $350/mo including maintenance.

Data 100 also showed its communications analyzer test device that can be used to troubleshoot data links by employing "selected test patterns." A line code analyzer in the unit is said to trap and store selected data characters or control codes used with IBM binary synchronous, CDC User and Univac DCT 2000 line disciplines. The test device costs $3,750 from the firm at 7725 Washington Ave. S., Minneapolis, Minn. 55435.

Programmable Interfaces

Datapoint Corp. introduced three communications interfaces for its 1100 intelligent terminal. The interfaces are programmable and, according to the company, allow users to change data speeds or code formats by modifying the interface program instead of requiring changes to the hardware.

Two asynchronous models and one synchronous model were unveiled, with the asynchronous units designed for RS 232B use or with Bell 103 and 202 or equivalent data sets. The synchronous version costs $1,000 or $30/mo, while the two asynchronous units cost $900 or $45/mo. Lease prices apply to three-year contracts.

The firm also exercised its Dataform II language which is said to simplify the creation of data entry programs on the 1100 terminal. The language allows users to create screen forms by typing the desired form on the terminal and defining desired editing functions such as numeric, alpha, zero-fill and others, a spokesman said. Once the forms are finalized, the operator can fill in the desired information, perform editing and input the data onto a cassette.

Data checking and manipulating functions can be utilized by the operator through elements of the language. Up to 26 programs can be applied to each screen format. The software will be provided to 1100 users for a one-time fee of $15, said to cover the cost of supplying the cassette on which it is stored.

Datapoint also introduced a 300 line/min printer for use with its terminal systems. Called the Model 9900-280, the printer attaches to any Datapoint system.

It includes a clutchless paper-feed mechanism along with a voice coil print-hammer positioning capability and is priced at $12,600 or $304/mo on a three-year lease. The firm is at 9725 Datapoint Drive, San Antonio, Texas 78284.

First in Family

International Communications Corp., Miami, Fla., showed the first in what will be a series of OEM modems. The initial offering is a 2,400 bit/sec unit designed for four-wire leased lines. It is called the Model CM244A and costs $560.

The LSI modem is described as the first in a series that will utilize LSI technology and incorporate built-in diagnostics. A second model, the CM242A, is designed for use on two-wire lines and will be available soon, a spokesman said.

Termiflex Corp. demonstrated its previously announced hand-held TTY-compatible interactive terminal on the exhibit floor.

The 1.5-lb terminal offers a screen displaying one or two lines of 10 characters each. There is an optional 1,000-char. buffer.

The terminal has a full Ascii keyboard and display—reportedly a first in a hand-held terminal. The terminal's four transmission speeds—10-, 15-, 30- and 120 char./sec—are switch-selectable on the unit. Parity is also switch-selectable, as is half- or full-duplex transmission mode.

The Model HT/1, with one 10/char. line display and 500-char. buffer, costs $1,190. The HT/2, with two-line display and twice the buffering capacity, costs $1,570. An acoustic coupler, power supply and carrying case for either model costs $480. An RS 232C/current loop interface and power supply costs $160. Termiflex is at 17 Airport Road, Nashua, N. H. 03060.

Burroughs Compatibility

Conrac Data Products announced that its Model 401-3 adaptive CRT terminal is now optionally available with Burroughs TD-800 compatibility.

Conrac, primarily an OEM maker, will supply the terminals to end users who purchase in large volume.

Conrac does not provide field support for the terminal, but will train the user's maintenance staff, a spokesman said.

The Model 401-3 offers transmission rates from 110- to 9,600 bit/sec, according to the firm.

The terminal costs about $3,000 in quantities up to about 50 from the firm at 600 N. Rimsdale Ave., Covina, Calif. 91722.

Raytheon was previewing its Raytheon Information Management System (Rims) for the PTS-100 display to solicit user response and reaction, according to a spokesman.

Rims is "a disk management system as contrasted to . . . a data entry system," the spokesman said. The system comprises a disk operating system, a high-level macro language, a complete set of maintenance utilities and a native mode compiler, the spokesman noted. The system also includes a series of testing facilities.

Rims can operate in a configuration that includes PTS-100 terminals, a PT2-1020 controller and Diablo disk with 2.6M to 20.8M bytes of storage, the spokesman stated.

Microprocessor-Based System Built For International Private-Line Use

By Ronald A. Frank
Of the CW Staff

CHICAGO — A dedicated, microprocessor-based, store-and-forward communications system has been built and is operating at RCA Laboratories, Princeton, N.J. The system was demonstrated last week at the International Communications Association (ICA) conference in New Orleans and was described in a technical paper presented here at the NCC.

Based on an RCA Cosmac LSI microprocessor, the system uses a CDS-110 floppy disk storage unit from Century Data Systems and was designed to operate with international private-line systems.

The microprocessor system serves as a control unit in a private-line system at RCA that connects a domestic office with an overseas location of the company. The heart of the system is the LSI Cosmac microprocessor which includes four Kbytes of MOS/LSI memory and a video interface. A console keyboard and display unit are connected to the processor for operator interfacing.

The systems controls the communications links by means of dual interfaces, one for the overseas link on a dedicated TTY channel and the other for the domestic circuit with an RS-232 modem attached to a voice-grade line. The floppy disk provides an additional 118 Kbytes of storage arranged in 64 tracks with 256-byte blocks of data.

Among the advantages of the microprocessor system is the ability to rapidly implement changing customer requirements, according to Philip Russo of RCA Laboratories, who presented the NCC paper.

Because of its flexibility, system specifications such as domestic and overseas data rates, character codes and formats, control characters, character sequence generation/detection and character expansion can be implemented through relatively simple software changes, Russo said.

Character expansion is required in the international data system because many of the Ascii characters utilized in the U.S. have no Baudot counterparts in Europe and are represented by sequences of valid characters. An example would be a domestic user who includes an Ascii dollar sign in his message, Russo explained. This would have to be expanded by the microprocessor control system to have the word "dollars" spelled out when the message was forwarded on the overseas link.

The Cosmac microprocessor was designed on a single 40-pin MOS/LSI chip and was described as providing a building block for a variety of stored program products including device controllers, terminals and CPUs.

If microprocessor systems such as the experimental one built at RCA are to become viable, "they will sink or swim on the I/O interface," Russo predicted. The Cosmac has a bidirectional 8-bit data bus or DMA channel. When a systems component fails, it is possible for the user simply to plug in a new component, reload the software and go, Russo said. To facilitate reloading the software, the interface for the floppy disk supports a bootstrap function which allows system regeneration in seconds, he said.

Experience to date at RCA with the Cosmac microprocessor indicates it is well suited to the types of processing required in data communications, Russo told the audience. Specific types of processing that can be easily handled are table look-ups, interrupt-driven software and data management, he added. One drawback is that multiply and divide functions can't be done in software but these are generally not common in low-speed message systems, Russo said.

Among the communications-oriented microprocessor systems envisioned for future applications, Russo listed intelligent multiplexers, buffers, concentrators and code/speed conversion devices. After that multi-microprocessor systems will be introduced, he said.

These systems are already feasible from a technical standpoint, and they will be introduced to operate either as stand-alone systems or for on-line applications such as front ends to larger network mainframes, he concluded.

Networks 'Must' Be Expandable

CHICAGO—The implementation of a computer communications network must allow for the continuing expansion of the system if the users' needs are to be met.

This was one of the main conclusions reached at an NCC session describing the development and operational experience associated with existing large teleprocessing networks. Among the nets represented at the session were the Nasdaq over-the-counter stock quotation system, the Boeing Computer Services time-sharing net, a system configured by the National Library of Medicine and a financial system operated by Payment Services, Inc.

Although some of the nets were commercial services operated to serve customers, there was a common concern for the ability to restructure the size of the respective network based on changing user needs. There must be an "accommodation for change," according to Morton Blanchard from Nasdaq, "because we will not stop growing."

Reliability and response times both have high priority in the quotation network, Blanchard said. When the system was first designed it was decided that 50% of the price-quotation inquiries should have a response within five seconds, and 90% should be within nine-second response time.

Howard Frank from Network Analysis Corp., Glen Cove, N.Y., cautioned attendees against expecting too much in the way of reliability from the planned packet-switching nets. These technical improvements will still be dependent on the reliability of the local telephone loop, he said.

Some for Commercial Use

Minis, Peripherals Dominate New NCC Hardware Products

By Vic Farmer
Of the CW Staff

CHICAGO—While minicomputer peripherals formed the bulk of the new products introduced last week at the NCC, several products had appeal for the larger business-oriented computer user.

Potter Instrument Co. added an off-line capability to its Grand Slam 1500 line/min impact printer. The PS3800 off-line print system handles three Potter printers concurrently. The system is compatible with IBM OS and DOS formats and requires no reprogramming or reformatting of tapes, according to the firm.

The PS3800 costs $2470/mo on a two-year lease for controller, printer and one tape unit.

Potter also announced the 500 line/min LP6350 helical platen printer. The device uses 22 hammers and a spiraling platen. The hammers are set in a single accessible bank and deliver 1,120 char./sec.

The expandable character set is read-only memory programmed and handles any foreign alphabet or custom font in upper- and lower case and in 64- or 128-char. sets.

The LP6350 is priced at $5,000 from the firm at 532 Broad Hollow Road, Melville, N.Y. 11746.

Keybatch Debuts

Data 100 Corp. offered Keybatch, a key-to-disk data entry system with communications capability. Depending on user requirements, Keybatch can be configured to permit either simultaneous or nonsimultaneous operations of batch processing and data entry features.

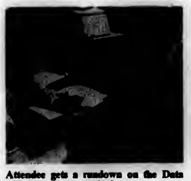
Line disciplines handled by the system include: IBM 2780, 3780 and Hasp; Univac 1004, 9200 or DCT 2000; CDC 200 User terminal or 730 series; Honeywell Series 100; and ICL 7020.

The data entry system can accommodate a cluster of up to nine stations with a 256-char. video display screen and a separate keyboard. Local stations can be installed up to 1,000 feet from the processor.

Editing can be expanded to include cross field interdependency with logical operators and branching, single- and two-dimensional table look-up, 14-digit floating point arithmetic, range and value checking, zero balancing and cross/footing, Cobol-like editing of numeric fields and output reformatting.

A typical configuration, either stand-alone or used with an existing Model 79 remote batch terminal, would consist of eight stations, a data entry control unit, a 2.4M-byte disk unit and a tape drive and would be priced at $40,824 or $1,176/mo on a one-year lease, including maintenance. Data 100 is at 7725 Washington Ave. S., Minneapolis, Minn. 55435.

Dataproducts' 2260 600 line/min printer uses a 64-char. set or optionally offers 480 line/min with a 96-char. set. Priced at under $8,700, the impact printer has an array fault indicator to identify "off-line" conditions. The standard code and character set is Ascii with OCR available.


Attendee gets a rundown on the Data 100 data entry terminal.

Dataproducts also announced a new remanufactured line printer ribbon service that will strip old ink and vacuum to remove paper fibers. The average cost will be under $8, according to the firm at 6219 DeSota Ave., Woodland Hills, Calif. 91364.

Writing Head Shown

Versatec, 10100 Bubb Road, Cupertino, Calif., introduced a dual array electrostatic writing head capable of producing a 200 dot/in. resolution. Three units incorporate the new head—the Matrix LP-1250 printer, 1200 plotter and 1200A printer/plotter.

The units have 2,112 writing nibs per 10.56-in. line and can plot 3.6M points on a 8½ in. by 11 in. page in nine seconds. The head prints dots which overlap each other producing higher contrast and sharper characters than previous Versatec printers in a 16 by 16 dot matrix. In addition to the 96-char. set there is an optional 128-char. set.

The 500 line/min printer interfaces directly with most computers and is priced at $7,400.

Because each raster line of dots on the Matrix 1200 plotter is scanned across the paper electronically rather than mechanically, dynamic error due to inertia and friction are eliminated, according to the firm.

The Matrix 1200A combines the features of both the LP-1250 and 1200 and is priced at $9,700.

3M Co., St. Paul, Minn., offered a self-threading computer tape cartridge which the firm said speeds loading operations. The C-143 cartridges are combined with 10½ in. tape reels on IBM 2420 and 3420 tape drives.

The cartridge and tape reel function automatically as an integral unit and manual threading is not required, the firm noted. The reels are priced at $3.50 each.

Miniperipherals Abound

Minicomputer users were offered the Sykestape Model 80 from Sykes Datatronics, Inc., 375 Orchard St., Rochester, N.Y. The single or dual cassette system is available with software and interfaces for all popular minicomputers and is priced at less than $2,000. The unit records at 800 bit/in.

John Potter stands proudly behind his PS3800 off-line printer controller.

The new Sykes Comput/Corder 140 utilizes the standard Ansi-compatible 3M DC-300 A cartridge, and the controller and interface design resembles previous Sykes offerings. The 140 will sell for $2,500.

In addition, Sykes demonstrated its new Series 7000 floppy disk system for most minicomputers. The system can be configured with either single or dual drives. Either model is available with a dual buffer option which reduces core requirements and permits asynchronous operations.

The Series 7000 units have a transfer rate of 250 kbit/sec and each disk can hold up to 2M bits. Prices for a single drive are under $3,000.

Tally Corp., 8301 S. 180 St., Kent, Wash., announced a family of printer interfaces and controllers that work with the Tally 200 Series 200 line/min printer, the Data General Nova line and the DEC PDP-11 minis, among others.

Dataram Corp., Cranbury, N.J., introduced a 16K single board memory designed to be plug-compatible with Varian's V-73 minicomputer. The main advantage of this board is that it requires half the space of the Varian unit it replaces, the firm said. The board is priced at $5,000.

Intelligent Memory Systems, Inc., Santa Ana, Calif., presented its IU 232 floppy disk system with an interface compatible with Ascii-coded communications equipment. Storage capacities range from 16K to 256K bytes using either removable cartridges or fixed-disk combinations. Average random access time is 16.7 msec.

Potter announced an RPG programming capability for the Potter System 85 floppy disk data entry terminal but had not finally priced this option.

Tektronix has added a graphics tablet an ddual floppy disk storage unit to its 4014 storage tube display to produce a system to digitize graphics information.

The system was demonstrated with a DEC PDP-11/05, but other minis could be utilized, a spokesman said.

Two graphics tablets were introduced which provide either a plotting surface of 11 in. by 11 in. or 40 in. by 30 in. The tablet converts the position of a pen on a writing surface into a digital format required to position the writing beam on the screen of the terminal.

The digitized data can be transmitted into the floppy disk storage or onto the terminal screen as it is detected by the pen traveling over the surface of the graphics being copied. The two-drive floppy disk unit costs $5,750, while a single-drive unit costs $3,495.

The smaller graphics tablet costs $2,795, with the large-bed model priced at $4,995, both including the necessary interface. The company's address is Box 500, Beaverton, Ore. 97005.

Conflicting Forces Meet

POS 'Revolution' Helps Retailer/Customer Interface

By Toni Wiseman
Of the CW Staff

CHICAGO—Retailing can be perceived as an interface between production capability and consumer demand, with the retailer functioning as a mediator between two inherently conflicting forces, attendees at an NCC retailing session here were told last week.

If the communication between these two forces is inaccurate or untimely, an economic fiasco can occur, Michael McHale, director of marketing for Unitote said, citing the Edsel and the midiskirt as past examples.

"The point-of-sale (POS) revolution is the employment of advances in communication technology," he said, to distill transactions into a meaningful form which the retailer can use to make his decisions.

"Whereas only a few years ago retailers viewed POS systems as fancy cash registers, today the trend is away from that type of thinking," with retailers now looking at it as a "POS data system," McHale said.

POS has improved the accuracy and control of transaction processing, he said. It has also aided in the management of back office functions, such as sales auditioning, through the use of on-line systems.

In the future, McHale said, POS systems will aid in purchase order management. "We will see systems which feature CRT entry of purchase orders and enjoy controls in warehouses and on receiving docks which we do not have today," he said.

Big ticket items, such as furniture and appliances, will be handled via a reservation system in the future, he said. This will eliminate long waits for furniture which is readily available in another branch store, for instance, or alternatively give the retailer instant information on manufacturer delivery status.

And, finally, personnel scheduling will be a key area in future developments, allowing retailers to effectively schedule their contingent help, he said.

Sam Harvey, corporate vice-president of systems for Singer Business Machines, also emphasized the importance of communication.

This change in emphasis, he said, is not merely an aspect of the POS revolution, but rather a symptom of the basic, fundamental needs of our society, the need to communicate.

A single phone line, with Intelsat I in 1965, cost $20,000 per year, Harvey said. By 1971, with the advent of Intelsat IV, that price had dropped to $700 per line per year, and he said the projected cost of an Intelsat V line in 1978 is only $30.

The laying of CATV cables with their 80 MHz capability will allow "a totally different kind of interactive communication than we have ever known before," he said, stating that this woud include communication between retailers and customers, retailers and manufacturers and among retailers themselves.

Chicago Chuckles

Overheard in the audience: "I'm surprised at the lack of girls at these sessions." Reply: "Really? I'm surprised at how many are here."

The mark-sense reader in the McCormick Inn coffee shop was observed to get occasionally overworked and calculate the price of two cups of coffee as three. "It does that when it gets hot," was the explanation.

Youthful Design

Fred White and Stephen Lowe of Ferguson High School, Newport News, Va., demonstrate a computer they helped design as part of the Science Fair here, proving not all the new products were in the exhibit hall.

Work 'Against' the Boss

Programmers 'Too Involved' In Data Base Management Use

By Don Leavitt
Of the CW Staff

CHICAGO—Almost every implemented data base management system (DBMS) involves the application programmer to an unreasonable degree, according to Donald Jardine of Queens University, Ontario, and a member of Share's data base project.

Speaking on an NCC panel comparing the Codasyl specifications and the Share/Guide requirements for DBMS, he added—in disagreement with fellow panelist Charles Bachman, who coined the phrase—that the programmer should not be a "navigator."

The programmer should work against the business requirements of his employer and should be "basically unaware" of the physical layout and access methods utilized by the DBMS. His view of data relationships, part of the navigator concept, is necessary, however, Jardine added.

There is no need for the programmer to be particularly aware of the security or integrity features of a DBMS, he went on, since this is not logically in their sphere. The data base administration staff has to be "up" on whatever security mechanisms the DBMS has so the programmer can't get at data he doesn't need, Jardine said.

Good Manners Approach

Basically, "a system that depends on programmers being ladies or gentlemen won't work," especially in the diffuse, communications-oriented environment a DBMS often entails, he said.

In that connection, Jardine remarked, record contention should not be a programmer problem either, since its solution requires a view of the system as a whole that is not allowed to the programmer.

Panelist Mike O'Connell, long-time member of the Codasyl data base effort, admitted Jardine was "generally correct" in his assessment of what should be expected of the programmer, but noted there are some contention problems the programmer can and should solve.

Any system should provide a wide range of tools for a wide range of users, he said, supporting the Codasyl specifications approach of leaving the solution of a number of problems to the individual programmer.

In terms of security, O'Connell noted, a programmer should be able to work through different processing paths in a single program, based perhaps on time of the month or any other criteria. On most DBMS, if the system controls accesses to data, only one processing path is possible for a program, he said.

Bachman also agreed with Jardine's view of the programmer's role in general, but agreed also with O'Connell. "You've got to be prepared for dirty fights right now," even if the ideal DBMS, sometime in the future, can cope with all situations, he stressed.

Who's at the Helm?

He seemed somewhat taken aback by Jardine's rejection of the "navigator" concept. An awareness of data relationships, and not all the subtleties of physical layout and access methods, was exactly what he meant by the term, Bachman explained.

IBM's Roger Holliday brought a new dimension to the discussion when he labeled as "cop out" the failure of Codasyl to detail implementation of its specification. In some sections, he said, Codasyl shows where the data base administrator can write routines to handle situations. In others, the programmer must handle his own problems directly.

Codasyl seems to allow the programmer or system implementor to leave out a facility, complained panelist and Guide member Chuck Mariet of Deere & Co. This may be all right if there is an adequate alternative to the facility being left out, but if not, he said the user effectively ends up with half a system.

Sperry Univac's Barbara Fossum countered with the thought that any system has to include lots of tradeoffs between security, for example, and flexibility. The user—the programmer—has to have the tools to cope with real situations, the Codasyl data base task group member added.

Wandering somewhat afield from DBMS, Mariet later told the panel he thought even high-level languages were getting back down toward the machine level. Cobol should help the programmer solve business problems, he reminded the group, and stay away from DP facilities.

Operating Systems Obsolete? Panel Asks

By Don Leavitt
Of the CW Staff

CHICAGO—"In the next five years, I hope we get rid of operating systems and generalized data base management systems," Capt. Grace Hopper said last week.

"I'm not quite that optimistic," Univac's Dr. Carl Hammer countered, "but within 10 years, I think we'll see the forerunners of large systems—operating systems, data base systems, executives and the like—being handled by hardware."

That interchange took place near the end of an NCC session of software for computer systems acquisition. The session panel was made up of members of the Navy's Cobol Compiler Validation Service, and before looking into the future, both Hammer and Hopper heartily endorsed the work of "those young men."

The Cobol Validation Service is charged with checking out compilers before they are brought into the federal inventory, panel chairman Paul Oliver noted, and this responsibility has led to the development of the routines that examine how well the compilers conform to the Ansi Cobol specifications.

The compiler testing is useful as well for determining how well programs could be converted to or from the compiler being evaluated, or for identifying a subset of features truly common to various compilers. The test does not check efficiency, Oliver noted, nor does it evaluate extensions beyond the Ansi specs.

The work on compiler testing led to development of a means for running benchmarks against the various compilers, panelist Pat Hoyt added, and this means had to avoid the problems of conventional benchmarks. He then outlined the details of this parameter-driven synthetic benchmark system the Navy put together to do the job.

Just as benchmarks were an outgrowth of compiler testing, data conversion was a natural outgrowth of benchmarks, according to panelist George Baird. The system the Navy built for this function takes care of such problems as validation of the data, character transliteration and sign translation, he noted.

Chain Reaction

It is particularly this chain effect of one project logically leading the validation team to another project that led Hopper to salute the team's work. She also was clearly pleased with the attitude, explicitly stated by Oliver but certainly implied by the others, that their work should benefit others as well as reward their own efforts.

This sharing extends to making the summary results of the compiler tests already completed available to the public, "but only on a compiler-by-compiler basis," Oliver emphasized.

The Compiler Validation Service has no intention of becoming a publication or mailing house, he said, explaining why he wouldn't respond to a request for summaries on all the testing done so far. He added that the summaries show where the compilers are not in compliance with the Ansi specs, but "in no way, do they even try to grade the compiler."

Closer to Compliance

Generally, the compiler vendors have responded very well to these reports, he added, and successive tests have shown closer and closer compliance with the standard. "And that movement towards true standardized compilers should help us all," he remarked.

Copies of the validation routines themselves are available through the National Technical Information Services, Springfield, Va., Oliver noted.

The Cobol Compiler Validation Service is part of the Navy's ADP Equipment Selection Office, Washington, D.C.

1974 No Exception to NCC Tradition Of Few Software, Services Offerings

By Don Leavitt
Of the CW Staff

CHICAGO—No one expected a National Computer Conference to be an overwhelming showcase of new software and services, and NCC 1974 was no exception. But there were some things to be seen and talked about among the exhibits this year.

Control Data, Minneapolis, Minn., was demonstrating a plotting capability (Plot 10) now available on its Cybernet time-sharing service, and a spokesman noted that this includes a facility to "preview" and edit output on a CRT terminal before releasing it to the plotter.

More significantly, a Cybernet source also said the long-expected linkup between Cybernet and Service Bureau Corp.'s network would get underway this July. By next January, he said, a single phone number would put a user in touch with the combined nets. He would then have the capability of picking the type of computing needed for a particular job, and going to the appropriate mainframe.

A first-time exhibitor, American Information Services (AIS), was describing its enhanced version of the IBM Virtual Machine Facility (AIS/370), an extensive editor system and a Virtual APL—with a workspace of nearly a million bytes—all on the company's time-sharing operations based in Greenwich, Conn.

AIS is marketing its services in the New York City, Washington, D.C. and Chicago areas; Call-a-Computer is handling the service in Massachusetts.

For the users large enough to consider installation of their own in-house time-sharing systems, the Dartmouth spin-off, DTSS, Inc. was on the floor offering the Dartmouth Time-Sharing System, which, they said, could support 64 concurrent users, even on a Honeywell 6025 configuration. Several hundred users could be handled on a large-scale system, DTSS added.

Basic price for the operating system is $7,500/mo, the vendor said, and total hardware/software cost might be as low as $24,000/mo.

Tesdata Systems Corp., McLean, Va., used the show to announce enhancements to several of its packages, including the Deadline 11 and Streamline Schedulers and Computer-Aided Systems Evaluation (Case), the simulation package.

With Deadline, scheduling controls have been extended from the previous nine workstations to 99, to allow points within a user's department to be included. A forecast module, including a calendar routine for year-ahead planning, is also in the new version.

Other improvements in Deadline 11 provide the scheduling of work at the OS step level for the computer operations resource area of a DP center. Pricing structures have also been revised so that "cost should no longer be a factor," Tesdata said.

Streamline, which schedules the computer resources in detail, has been enhanced so that data collection for job stream scheduling is now "90% automatic" where SMF data is available. More extensive use of SMF data—including extractions from eight different record types—is said to be the key improvement in Case as well.

On the mini side of the business, Vector General of Canoga Park, Calif., announced an update of its Fortran-based Drawing Package (FDP) to operate under RSX-11D on DEC's PDP-11/40 and 11/45. Vector also announced a remote graphics language designed for satellite graphics applications with a Decsystem-10/PDP-11 linkup, and the Vectorgraphics 11 Graphics System.

Flexibility in Terminal Use May Be Bad, Study Shows

By Don Leavitt
Of the CW Staff

CHICAGO—Regardless of terminal type or the user's DP experience, allowing a lot of user flexibility in terminal work may not be a good thing, according to research reported by G.H. Walther.

An associate professor at the Air Force Academy, Walther outlined an experiment in which subjects—with differing levels of DP knowledge—used two different editing programs (one far more flexible than the other) and ran a set of 18 predefined text-editing tasks on teletypewriters and CRT terminals.

Not being sure what factors might affect the results, he measured the subjects' typing skills before the tests, but found that differences in this area were insignificant. A subject's pretest attitude, however, did impact the results, Walther found, with hostility generally depressing one's effectiveness.

Speaking at an NCC session on Improving system effectiveness, he said he clocked the times to complete all the tasks and the number of errors made with each combination of terminal type and editing program. They hobbled the CRT so it operated at the same speed as the teletypewriter, Walther added.

All subjects tended to be faster, on first encounter, with the nonflexible editing program. Apparently the definitiveness of what had to be done helped under those circumstances, he said.

Another finding, surprising to Walther, was that users tended to make more mistakes on the CRT than the teletypewriter. He had anticipated that the CRT keyboard's similarity to a typewriter would have eased their work, but this was not the case.

In addition, he noted, "neither the CRT nor the teletypewriter always works better with any level of flexibility in minimizing time."

Before Walther described his experiment, Texas Technical Institute instructor G.C. Steinhorst proposed an approach that might improve the effectiveness of a different DP operation. He wanted to help the statistician do his work more easily.

Steinhorst noted that although many programs handle individual statistical tasks, users generally have to pass results from one program to another manually to get complete results or analysis of the data.

Why not, he asked, couple a number of these processing modules with an executive routine and a central data base that would hold all input data, intermediate calculations and, in the end, the final output? If done correctly, this should allow statisticians with little knowledge of programming to use the system, as well as easing input entry from process to process.

Co-op Computing: Future Vogue?

CHICAGO—"In the next 10 years it will be as much in vogue to belong to a cooperative data processing system as it was a short time ago to invest in your own computer," Robert Farmer, manager of state and local systems, Computer Sciences Corp., told NCC attendees here.

The spiraling costs of government and data processing already have convinced some local groups that the way of the future is to join others, thus sharing hardware, software and operation costs.

Wayne State University associate professor of political science Leonard Stitelman expounded his notions of "base data clusters"—joint automated systems efforts among metropolitan or other political subdivisions.

He explained why one six-county group explored, but rejected, alternatives to the cluster plan.

"A nonprofit corporation or authority under direct supervision of the participating counties was rejected due to anticipated high start-up costs and the need to bring in others to make it pay," he said.

"A single government unit acting as a service center was also rejected for fear the community performing as the service center would receive favored treatment," Stitelman continued.

"The concept of a commercial service bureau was also turned down because of concern that the community's needs would not receive the highest priority and apprehension over possible use of canned, all-purpose programs not designed specifically for government needs.

"The data-cluster theory is successful because it does not attempt to presuppose preconceived ideas on its own development. It is built on the strength of geography, politics and personalities in whatever combination is workable, and could go a long way in improving all areas of cooperative efforts among the members," he said.

A similar effort to share data gathering and processing was established on the strength of the Council of Governments and includes 15 major jurisdictions in and around the District of Columbia, according to Franklin F. Goodyear, director of data systems, Metropolitan Washington Council of Governments.

A third type of sharing, described by Edward Pechan III, is a software program developed by the Environmental Protection Agency (EPA) through which local governments can measure the anticipated jurisdictional expenditure necessary to meet future EPA clean water standards.

Multiple Diseases Slow DP Diagnoses

CHICAGO—Simulating medical diagnosis requires quantifying vast numbers of variables that a physician learns to sort out largely through intuitive judgments based on practical experience, it was pointed out to NCC attendees here.

Despite the difficulties inherent in the process, some computer scientists forging ahead discussed their progress at a session in which Dr. Lee Lusted, a radiologist and computer scientist from the University of Chicago Medical School, set the tone.

"The difficulty in applying standard logic to diagnosis is compounded by the fact that there is rarely only one disease present in a patient at a given time. More commonly, several diseases appear simultaneously," he said.

Describing his work creating mathematical representations of disease, Casimir Kulikowsik, Rutgers University, discussed medical knowledge in terms of planes.

"First there is the plane of observation—hypotheses of disease in general. Second, there are clinical states—symptoms measured through instruments—and third, there is the biophysical and biochemical plane."

Simulation models are not very helpful because information is usually lacking, he said.

"There is a causal network—you can trace the pathways of diseases, but no one has looked at the interface between models of disease and the statistical decision approaches," he explained.

"These apply only to diagnosis," he said. "Therapy is a new consultation program entirely."

Boolean logic—a logic of set theory which allows one to string together descriptions in terms of a type of algebra—has been applied to recordkeeping by Dr. Allan Pryor of the Latter-Day Saints Hospital, Salt Lake City.

Performance Tools Bring Cost Savings Here

By Molly Upton
Of the CW Staff

CHICAGO—Armed with data from carefully planned and implemented performance evaluation procedures, users can make decisions resulting in significant cost savings, according to speakers at the session on technology investment management. Attendees were told how Rand Corp. decided to remove 1M bytes of core which was costing $7,500/mo, and United Air Lines (UAL) postponed upgrading CPUs and acquiring $1 million in drum storage for at least a year by using evaluation techniques.

However, performance evaluation procedures must be done methodically, and JoAnn Lockett and A.C. Shetler of Rand Corp. detailed recommended procedures when evaluating performance in controlled environments and mixed workloads, or those combining both batch and on-line jobs.

In an award winning paper, Paul Malick, staff analyst for UAL described Systems Performance Measurements—A Quantitative Management of Computer Systems. He concluded that the systems performance group pays for itself.

At UAL, systems performance measurement groups provide input for budgetary considerations on computer acquisitions and utilization by indicating in a quantitative manner how well current resources are being used, and what impact hardware, software and applications changes and/or additions will have on systems utilization.

The group uses hardware and software monitors as well as simulation and modeling techniques to prepare reports which management uses as the basis for five-year plans.

A Penny Earned

With the aid of these reports, UAL has decided to postpone for two years the acquisition of $1 million worth of mass storage drums for use with its three Univac 1108s in the operations division.

It found through a hardware monitor that "the actual average access time was 30% less than the manufacturer's specification. The difference was due to the amount of storage used and the data placement on the drums for the UAL application mix," he said.

In another data center, the airline decided to upgrade to the largest capacity computer available thus avoiding an interim conversion.

The decision was based on predicted resource utilization that showed the life of a new computer to be five years, he said.

By having figures on how long it would have excess capacity on this machine, the airline signed contracts for services with several outside firms, thus producing revenue in the interim.

In a third instance, United decided to postpone for one year upgrading two IBM 370/155s to a pair of 168s to handle peak summer traffic.

"Measurements indicated the peak CPU load buildup was very high. Using these measurements as a base, it was predicted that the peak load would be at or near system saturation, causing great disservice to our users," Malick said.

"System optimization and offloading of jobs to the backup computer for the marketing system reduced CPU activity by 10% down to 75% below the predicted peak."

Malik said this technique worked so well last summer United plans to use it again for this summer, thus effectively postponing upgrading for two years.

Sum of the Parts

Hardware monitor measurements represent a composite of all individual times or events, while software monitoring gives another measurement method to reconstruct the components which make up the total, he said.

Simulation techniques are used to answer questions such as:

- "What impact will various changes and/or additions have on the system quantitatively?
- "When and at what level will the system saturate?
- "What are the system bind points?"

Five computer resource areas are managed as a system, and parameters for performance evaluation are established for the CPU, memory, I/O channels, peripherals and data communications.

Modeling, he warned, is an expensive process, both in terms of time and energy, and may not always be economically justifiable.

In a detailed case study Lockett explained how Rand needed some information on what the effect of removing 1M bytes of core would have on present users of its IBM 360/65. The system was running under OS/MVT with 512K main core and 2M bytes of add-on, one from IBM and one from Ampex.

Rand's charge-back records indicated that its Conversational Programming System (CPS), which required 648K to run, was not in very great demand. Use of CPS had contributed $1,300 in revenue to DP operations in six months, but the core cost $7,500/mo.

Who Needs It?

By interviewing users of CPS, Rand decided removal of CPS would not cause any great disruption. The question then was to what extent would removal of 1M bytes of core disturb present users.

Data was collected for a three week-period, running the full 2.5M bytes during the first and third weeks and 1.5M bytes during the second.

Criteria established were a 50% reduction in idle time of the processor was acceptable for CPU utilization and batch turnaround could increase from 30 minutes to an hour.

Log-in data from batch users was run on a statistical program, and showed the average increase time to be from 30 to 43 minutes, well within the target time, Lockett said.

"What really surprised us" was that CPU utilization increased only between 5% and 10%, she said.

One Mbyte of core was removed, for a savings of $7,500/mo.

Lockett offered attendees several suggestions for performance evaluations.

Complete test planning and pilot testing are extremely valuable, she said. Allowing extra time prior to actual testing to try out testing and data collection procedures will assure that tests provide adequate and meaningful data on which to base important decisions, she added.

"Decision criteria should be chosen prior to data collection. The data can be collected in a form which will reduce time spent on analysis. Prior definition of these criteria force the analyst into defining his goals without being biased by the results of data collection," she noted.

In conclusion, she said, "Useful measurement of on-line systems is possible and can be done without expensive equipment."

Man meets ancestor at the full-color Comtal 800 digital image display.

Everyone wanted their pictures reproduced when Spatial Data Systems demonstrated its equipment by giving out digitized reproductions.

Exposition Emphasizes Approach Of Reflecting Peoples' Needs

(Continued from Page 1)

of-the-art hardware.

There were two IBM mainframes on the exhibit floor (neither in the IBM exhibit) plus a System/7, not generally considered a "mainframe."

Comdisco, an equipment broker, brought both IBM units, a 360 and a 370, a feat even the industry giant never managed to duplicate. But neither the 360/40 nor the 370/155 appeared in quite the physical or aesthetic setting IBM might have chosen.

The Model 40 shown was a barebones 32K processor. Next to it, a price list showed would-be buyers potential savings compared with IBM's original list price. (Comdisco, by the way, sold the 360 to Computer Research Corp., a Chicago service bureau, during the third day of the show.)

The 155 was placed in the Control Data Corp. exhibit by Comdisco amid a bevy of CDC plug-compatible peripherals which included main memory, tape and disk drives, an output printer and some remote batch terminals. The user-oriented CDC presentation was a change from the firm's previous mainly OEM displays.

For users interested in a CDC-enhanced IBM mainframe, CDC announced a total-system lease plan in conjunction with Commercial Credit Co., its financial services subsidiary.

The "smaller" minicomputer companies seemed to be showing more user-related products. Digital Equipment Corp., Hewlett-Packard and Data General's booths lacked the long rows of on-line terminals that have attracted attendees in the past, and nearly every other mini maker, except Varian, had processors and/or total systems on display.

Microdata demonstrated its "Reality" mini-based, time-sharing system, previously limited to OEM users, but now being offered to end users through a dealer network. The basic system (16K core, 5M-byte cartridge disk, 165 char./sec Centronics printer and Adds CRT terminal) sells for $47,500. This includes the Reality English-based, programming-oriented software system which operates in virtual mode.

Xerox had no hardware on display, instead using its sculptured booth to present slides to weary floorwalkers on several user applications.

Those entering the huge exhibit hall for the first time had a hard time overlooking the IBM display at the main entrance. After a full-color, multiscreen presentation on the benefits of computing power, several versions of the System/7 and the terminal-based banking system were available for demonstration.

Although no specific product types could be described as dominating the scene, terminals and minis together with their related system components were most in evidence. But even in this broad category most of the displays contained previously introduced equipment, often embellished with an applications-oriented enhancement.

The latest technology was not always the main approach, and Fabri-Tek was ready to convince users that its core-memory "micro-processor" was a better cost-performance buy than similar semiconductor memory systems. The firm's MP12 system uses software compatible with the DEC PDP-8i and costs $1,968 in its basic configuration.

Interdata used teletypewriters to demonstrate its interactive system.

Panorama of exhibit floor (CW Photo by Vic Farmer and Hank Fling)

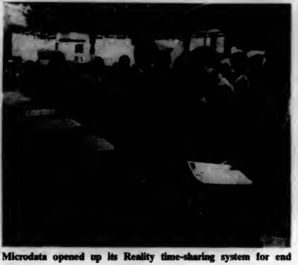
Modcomp demonstrated a hierarchical minicomputer network.

Basic Timesharing, Inc. demonstrated its Basic 3000 system.

CW Photo Feature
By Vic Farmer

After handing out 5,000 bags of peanuts, the Sycor girl could still smile.

Vector General attracted sightseers with moving CRT display.



Microdata opened up its Reality time-sharing system for end users.

The Bicentennial Association could tell you whether any 200th anniversary events are planned for your state.

A model shows how the Gould 5000 printer works.

Automated Warehousing Systems Can Replace 'Dirty Jobs

By Toni Wiseman
Of the CW Staff

CHICAGO—Warehousing is one of the big automation applications of the Seventies, NCC attendees were told at a distribution session here last week.

One reason for the sudden interest is that it will become increasingly difficult to hire people to do these dirty, low-paying jobs in the future, Phil Witt said.

"Take all you have learned from DP and throw it out before you start designing and implementing an automated warehouse," Witt, of IBM's distribution systems staff, said.

"You can't plan different implementation phases, hierarchies of programs and segments of staff; the system goes in all at once and it either works or it doesn't. It's a real test of your people."

Witt described the automatic storage and retrieval system (ASRS) used at IBM's Endicott, N.Y., materials distribution center.

There were a number of benefits derived from implementation of ASRS, he said. First, the Endicott pipeline inventory was substantially reduced. In addition, many leases on off-site locations were terminated, personnel brought back on-site and the system designed to suit IBM's particular warehousing needs.

"The ASRS also reduces manpower operating costs since it moves the product to and from the operator for storage and picking, essentially eliminating the long and unproductive transit time of men going into the storage area to fill requisitions," Witt said. "Basically this keeps men productive 100% of the time."

The ASRS consists primarily of a parts-storage area, nine 300-ft aisles with a stacker crane for each aisle, 18 rows of high-rise racks for pallet storage and a conveyor belt network.

ASRS is controlled by an IBM 1800 data acquisition and control system, he said.

Through the Labyrinth

A number of steps are entailed in moving a pallet through the system.

First it arrives for input to the system either from a new pallet spur, accessed from a docking area lift, or from a recycle spur.

Next, Witt said, the operator removes a badge from the pallet and inserts it in the IBM 2791 area station for identification.

These badges, two for each pallet, have a reflective and a nonreflective side, allowing for four different routing instructions, while only three are actually needed for the system, Witt said. There is also a number punched in the badge which controls the flow through the system's conveyor network.

Part identification is the next step. The operator removes a two-part, 80-column punched card from the pallet. One part stays at the input station for keying in data and later auditing the input transaction, while the second part remains with the pallet for parts identification during picking.

Next, the operator enters the punched card from which the part number and qualifiers are read and then keys in the part-number quantity on the pallet.

At this point the system takes over, performing a preliminary audit on the transaction to verify validity.

"At the completion of the transaction, the operaataor replaces the badge and presses a button next to the spur, signaling completion of his task and indicating which spur the pallet is on," Witt said.

When the transfer leading to the size-sense station is empty, the computer signals the conveyor to move a pallet.

"It is important to realize that everything in the system is done on positive action," Witt said, rather than being timed.

At the size-sense station, the physical characteristics of the load are determined by photocell beams which are broken by the load.

If accepted for storage, the location is selected from all available slots in the nine aisles, with the restriction that seven are for 52-in. pallets and two are for 62-in. pallets.

ASRS also considers inoperative cranes and evaluates the percentage of proper-height slots available in the various aisles, Witt stated.

"If another pallet holding the same part number is already stored, an attempt is made to put the new pallet into a different aisle," Witt said, explaining that this reduces the risk of parts being unavailable because of crane downtime.

Trudi,
of New York Computer Caravan Fame, wants to thank all the guys and gals from:

Lockheed Electronics
California Computer Products
Sycor
General Computer
Hewlett-Packard
Centronics
Control Data
Delta Data
Texas Instruments
Raytheon Data Systems
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Scope Data
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Digital Equipment
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BASF
Boeing Computer
Cullinane
AT&T
Interdata
Computer Devices
Penril Data Communications
Hazeltine
Auerbach
Beehive Medical Electronics
Omnitec
Datapoint
ICC/Milgo

And Trudi --
they thank you.

Top Management Support Needed For On-Line Manufacturing System

CHICAGO—An on-line manufacturing information system is more likely to succeed if manufacturing personnel have designed and developed the systems concepts and top management offers total support, Thomas J. Archbold, manager of systems and data services for the construction equipment division of International Harvester Corp., told an NCC session here.

The implementation effort should have its own project manager from the start, and he should report directly to the "highest level of manufacturing management in the division or works," Archbold advised.

Data Base Analyzed

And before the on-line project wins approval, he said, the firm's data base system should be carefully analyzed for reliability, because problems there mean bigger ones in the on-line system.

The firm should launch a training program including all levels of manufacturing personnel, Archbold said.

Hardware is the smallest part of the problem and equipment selection should follow the system design, he said.

And the company must coordinate equipment installation with the telephone company, equipment vendor and company engineers, he noted.

But the most important factor is that management be "totally committed to the project and must get involved," Archbold stressed.

International Harvester's construction equipment division launched an on-line system in 1971 to improve efficiency and responsiveness to customers. The resulting program was dubbed Mics, (Manufacturing Information and Control Systems).

Mics' primary objective is to "generate realistic and economic manufacturing schedules for the machine, fabrication and assembly departments," Archbold said.

The plant has a 2.4-million-ft manufacturing floor space, 70 interdependent departments, 2,200 production machine tools, and 120,000 manufacturing operations. It produces a line of heavy construction crawler tractors and diesel engines.

The computerized material manufacturing system in use before Mics was oriented to either weekly or monthly reports, but the firm felt management needed more help in reacting to relatively short-notice needs.

In 1968, International Harvester appointed a five-person group to design a pilot Mics system. A manufacturing representative chaired the group, Archbold noted.

The pilot system, relying heavily on sensors, served essentially as a "laboratory" for experiments on whether to proceed.

Mics will handle parts tracking, job-order loading, mechanical requisitioning of material and other tasks, Archbold said.

Implementation of the Mics system was split into three phases. The first enabled management to use the system to collect and maintain information on parts availability and simple assemblies.

Phase two reduced parts shortages on the assembly line and cut expediting activity.

Phase Three

Phase three developed economic manufacturing quantities on all jobs, helped reduce and better allocate work-in-process inventories, helped reduce the amount of decision-making by first-line supervisors and improved the performance-evaluation capability of the departments.

Equipment for the Mics system includes about 70 IBM 2791 terminals and an IBM System/7 processor, with supervisors accessing the data base through 32 typewriter-like terminals.

An IBM 370/168 10 miles away communicates with the System/7 at 4,800 bit/sec. A 155 could handle the Mics system, Archbold said, adding that the 168 handles work on other Mics.

Archbold said his group programmed the entire Mics system in Cobol, noting that the core cost of this approach has gone down in the last few years. A big advantage of the high-level language, he said, is that his group can hire someone from a university, train him for a few months and then have him go in and make changes to the system. Assembler talent would be harder to find, he said.

CW Photo by E. Bride

Afips execs Glaser, Berthiaume, Yau and White address press on new activities slated for future outside of national conferences.

Afips Reports Progress

DP Job Descriptions Coming

By a CW Staff Writer

CHICAGO—Standard job descriptions for programmers are in the offing, thanks to a new professional practices and standards committee chaired by Donn Parker of Stanford Research Institute.

The job descriptions are being published by Afips Press and will be available in about three weeks, according to officials of the American Federation of Information Processing Societies (Afips).

During a press briefing at NCC, the society also announced the committee's proposal for the next standard job descriptions—for systems analysts. An Afips board ruling on the proposal was expected last weekend.

In announcing new activity of an expanded scope, Afips President George Glaser said the federation had offered assistance to the Federal Reserve Board, which is contemplating a method of regulating electronic transfer of funds both among consumers and consumers, banks and merchants.

Ex-Afips president Bernard Galler is chairing a special committee on electronic funds transfer, offering Afips expertise on "Regulation J." Any modifications to this banking regulation would constitute the "enabling legislation" for electronic funds transfer, Glaser explained.

Because of its status as a tax-exempt educational institution, Afips cannot legally "lobby" for any specific legislation, Glaser noted, but the federation can offer guidance "where we have the expertise."

Paul Berthiaume, Afips vice-president, reported the two-year effort toward a "systems review manual" is near an end. The project, headed by John Gosden of Equitable Life, has resulted in a 13-chapter manual scheduled for publication by Afips Press in September, Berthiaume noted.

The entire project of systems certification is the brainchild of Keith Uncapher who, as president of Afips, inaugurated a project to standardize various elements of hardware and software technology. The first phase will deal with data security and privacy.

Afips Executive Director Robert Rector also revealed the federation is contemplating renewal of its triennial personnel survey, theoretically due again this year.

As with other nonconference activities, there is a "proposal before the Afips board" on the personnel survey, and an announcement regarding their decision is imminent.

Among other pending items is Afips membership for the Data Processing Management Association (DPMA), which has "tentatively" applied for full membership—i.e., the application is awaiting DPMA ratification.

DPMA would be the fourth "full" member (there are 10 affiliate members) sharing in conference revenues. The Institute of Internal Auditors (IIA) has applied for affiliate membership and, after DPMA, would become the fifteenth member of the federation.

Let Washington Feel Our Presence, ACM Told

By a CW Staff Writer

CHICAGO—The central task facing professional societies concerned with influencing government on a nonlobby basis is letting Washington know, in an informal manner, that they exist, Michael Noll told SigCAS, the ACM Special Interest Group on Computers and Society here last week.

Formerly a member of the Office of Management and Budget (OMB) and now with Bell Laboratories, Noll said, "Many professional societies seem to feel they should make their technical competencies available to government. While this is good," he continued, "you simply can't force advice on governments any more than you can on individuals. Washington must come to recognize the existence of a problem before looking for advice."

When it encounters a problem, Noll contended, government will go directly to those organizations whose technical expertise it recognizes and respects. "It isn't necessary to lobby in order to gain this kind of recognition," Noll commented. "It is necessary to have informed harried government officials beforehand of the extent of your society's resources."

By maintaining frequent, informal contact with government agencies holding the purse strings, professional societies like ACM can instigate the planning so absent from government operations in Noll's view.

Having learned of Afips' interest in establishing a Washington presence, Noll commended the idea, but stressed that contact with agencies be kept relaxed.

"Just as government officials need to know who you are and what you can do, you should know their constraints and capabilities," he continued. To facilitate this kind of exchange, Noll proposed devoting an evening at a conference like NCC or ACM '74 to a session at which professional societies could meet with funding agencies. This "mini director's review" would provide societies and agencies alike with an opportunity to communicate.

SigCAS Chairman Peter Lykos said Noll's suggestion had been given to Tony Ralston, ACM president, and that plans are under way to conduct such a meeting at the next Computer Science Conference in February 1975.

Both Noll and several members of SigCAS felt the Computer Science Conference might not draw the range of professional societies present in the computing field. They repeated their suggestion that NCC might be the best setting for a meeting with government agencies because it attracts those from all aspects of the field.

Lykos said a decision has not yet been made on the matter and the recommendation to hold the meeting at NCC will be considered.

Charge-Back Systems Should Take Practical Accounting Approach

By Don Leavitt
Of the CW Staff

CHICAGO—DP centers in banks should be run on as businesslike a basis as any other function area, but the charge-back system used probably should be based on realistic, practical-capacity accounting rather than full-capacity accounting, according to Wayne Sams, senior operations officer of the First Wisconsin National Bank.

Addressing an NCC session on guidelines for EDP banking evaluation, he said the chief disadvantage of full-capacity accounting lay in allocating the cost of the large amount of capacity currently unused but required for future growth. Another problem occurs because equipment purchases in banks are not based on average production requirements but on the need—under federal regulation—to be able to service the peak load on a timely basis.

Under full accounting, Sams went on, the total cost of the DP system is divided by the cost of the available resources to arrive at a cost per CPU cycle. The available resources include all the time actually available to the user, omitting only planned equipment maintenance time.

Each service line using the computer is charged standard costs for its average production time. Software development is charged to the program or project involved, but software maintenance is a direct cost to the service line, Sams added.

Under the realistic or practical-capacity approach, he pointed out, planned downtime, system overhead and "unattainable capacity" are all excluded from the costing calculation. Current production, software maintenance and software development are charged out as they were under full-capacity accounting.

However, the current excess capacity of the system, acquired in anticipation of a particular service lines needs, is charged exclusively to that service line, he stressed. This approach tends to increase the cost per cycle, directly charged to a service line, but minimizes the amount of ill-defined capacity that has, somehow to be charged back to a number of departments that might well resent the added burden.

Under either scheme, Sams noted, First Wisconsin works with a variable-cost concept, so charges to a using department will vary with volume. Under this procedure, a "moderate" (as little as 5%) fluctuation in service line volume will result in a corresponding increase or decrease in expense, Sams noted.

Although one of the bank's objectives in setting up a cost allocation system was measurement of DP center operating efficiency, this has not, in fact, been done. The realistic capacity approach does meet another design objective, however, it gives a good close guide to the measurement of equipment capacity, Sams concluded.

Never the Twain

The IEEE Computer Society is holding a conference on mass memory hardware and software in Rosslyn, Va., May 22-23.

Consisting of discussions on hardware and software technology relating to mass memory and large files, the workshops will be conducted at the Marriott Key Bridge Hotel near the west end of Key Bridge.

Meanwhile, the National Academy of Science—National Research Council is holding a conference on large file hardware and software in Washington, D.C., also on May 22-23. Consisting of discussions on hardware and software technology relating to large files and mass memory, the workshops will be conducted at NAS headquarters located near the east end of Key Bridge.

Programming Needs to Be Taken Seriously: Dijkstra

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—The potential of computer equipment will only be fully realized if the programming task is taken more seriously, according to Dr. Edsger W. Dijkstra, this year's recipient of the Harry Goode Memorial Award presented by Afips at NCC here.

Dijkstra, a research fellow with Burroughs at Neunen, The Netherlands, and the first international figure to be singled out for the award, was honored for his work in the science of programming, leading to enhanced understanding of computer programs and the programming task.

The award, he said, can be viewed "as a symptom of a broadening recognition of the relevance of a cause to which I have devoted more than the last decade of my life, and as such it is very gratifying."

But he noted he was not the only one to contribute to this area, and therefore accepted the award "in the name of all those colleagues, known or unknown, who have contributed.

"The cause in case is the conviction that the potentialities of automatic computing equipment will only bear the fruits we hope, provided that we take the challenge of the programming task seriously," he said.

In addition, Dijkstra added, we should "realize that what we are called to design will get so sophisticated that elegance is no longer a luxury, but a matter of life and death.

"It is in this light," he said, "that we must appreciate the view of programming as a practical exercise in the effective exploitation of one's powers of abstraction."

Systems are becoming so sophisticated and complex, he said, "that we must appreciate all current efforts towards raising the level of confidence in the correctness of our programs, the reliability of our machines and all efforts to discover the intellectual disciplines needed for controlled design."

Today, he added, "we are in the midst of an exciting process of clarification, of improvement of our understanding of the true nature of the programming task and its intrinsic difficulties."

However, he sounded a note of warning "because, to my great regret, already progress is being oversold.

"Simple souls have been made to believe that we have all of the answers to the problems of the programming profession," he said.

In a few years, it will become apparent that not all the answers are known, "and then the same simple souls will denounce us as quacks."

Just because "programming discipline reflects itself in a coding discipline," Dijkstra said, there is no justification for "the expectation that the problems of programming can be solved by a few measures such as a new, clean programming language or a new management structure or a new mechanical aid.

"Such measures may assist, certainly, but only provided we do not overestimate their significance," he concluded.

CW Photo by V.J. Farmer

STC Displays Disks, Tapes

Storage Technology Corp. demonstrated both the 8800 disk drive and its 6,250 bit/sec tape drives, which are schedules for delivery next month.

Retailers/Vendors Exhibit Cooperation on Standards

By Toni Wiseman
Of the CW Staff

CHICAGO—Vendors have exhibited a willingness to cooperate with retailers in seeking voluntary standards, if the results are mutually beneficial, attendees were told by Irving I, Solomon at an NCC session.

Speaking for the National Retail Merchants Association (NRMA) in reference to industry efforts toward standardization and a source marking system, Solomon said, "What we want are terminals every retailer can use if he wants to move goods quickly from the distributor onto the selling floor."

He explained the different task forces which NRMA has established, many in cooperation with the National Bureau of Standards (NBS), in an attempt to establish voluntary industrywide guidelines.

These include task forces for merchandise identification, customer identification (credit cards), terminal systems and source marking.

"We have to tell the manufacturer what we want to do to work out programs," Solomon said, "what we as an industry would like to have to satisfy our needs at the point of sale."

In order to explain their needs to the manufacturers, retailers must do work on their own, he said. They must first determine which are "must" requirements and which are options.

Next, operational guidelines must be set, Solomon stated, in terms of up-time, speed and performance specifications.

The engineering specifications are then up to the vendors, he said, "but first they must have retailer input and support.

"NRMA has come out in support of OCR-A size I as a desirable technology," he said, "and manufacturers have now agreed to work on it. In fact, we are testing several readers for OCR-A."

Only the Beginning

A standard is a starting point, not a culmination, he said. And the standards established today will be modified, changed and improved as technology advances. "But the standards must come first," Solomon again emphasized.

Retailers realize the advantages of a source mark system, Solomon said. They include lower cost, faster processing of goods from the manufacturer to the floor, elimination of in-house ticketing and greater accuracy in marking.

More detail can also be obtained if source marking is used, he said, in terms of season, style, fabric and color, all of which will aid in determining sales trends and thereby facilitate faster stock turnover.

In fact, he said, "the only way to save money in the area of merchandise marking is to pay the manufacturer to mark at the source. What costs the retailer four cents to mark costs the source marker only two mil."

There are problems with such a system, Solomon acknowledged. The quality of coding and punching, different in-house operations, lack of industry saturation and vendor disinterest are just a few of them.

The transition time to the new standards will be one to two years, he said, about the same time it will take to get terminals into a majority of stores.

Zane Thornton of the NBS emphasized the need for an industry standard for not only mass merchandise retailers but supermarkets as well.

"The wine and liquor guy doesn't know whose label to use, OCA or UPC, because he sells to both segments of the industry," Thornton said, "and the same is true for the seed packager, the hosiery manufacturer and many others.

"If manufacturers have to put on two labels or have separate marking runs, the added cost will ultimately be passed on to the consumer, who isn't going to be happy," he said.

"Voluntary standards are an increasingly important part of the automation effort," Thornton stated, "but it's not enough to have a standard within each segment of the retailing industry. The industry must be compatible within itself and with other groups, such as banks, with which it, the industry, will have to interface in the future."

Shop Floor Control Prices Coming Down Through DP

By Patrick Ward
Of the CW Staff

CHICAGO—Computer-based shop-floor control systems have become better and less expensive in the past decade, while the cost of factory labor and clerical help has climbed, James O'Toole, vice-president of Mid-America Computer Corp., told an NCC session last week.

Shop-floor control systems are necessarily real-time systems, O'Toole stressed. The shop floor is a dynamic environment calling for quick decisions, and "you can't solve today's problems with yesterday's reports."

Meeting the Menaces

On any workday, factory management may face unexpected special orders, machine breakdowns, manpower shortages or late vendor deliveries. All of these occurrences can obstruct factory production, and real-time shop-floor control gives managers the quick, dependable warnings they need, O'Toole stated.

Another reason for real-time response is the ability to edit data on the spot while the user is present. This lowers correction costs and ensures reliable data, O'Toole stressed.

The best shop-floor control data entry device is a punch-card terminal of the IBM 2790 type, O'Toole remarked. It reduces user effort to a minimum and automatically applies the time to entries.

Touch-Tone phone data entry is becoming increasingly important, but such devices can't work with documents as the punch-card terminal can, O'Toole noted.

Optical scanners are promising, but so far don't have a time imprinter attached.

O'Toole described a system at Flick-Reedy Co., one of his firm's customers, using a shop-floor control system involving 84 IBM 2790 terminals controlled by an IBM System/7.

In addition to the System/7, Flick-Reedy accesses an IBM 370/145 at Mid-America's office 25 miles away in a "distributed processing" arrangement, O'Toole said.

The shop-control system saves Flick-Reedy $1,249/mo, he stated. The 84 terminals and the System/7 lease for $5,700/mo, he said, while access to the 370/145 for batch work costs $3,000/mo.

It All Adds Up

The savings comes through productivity, up 2% or $4,000/mo, and a 27% reduction of work in process, saving another $2,200/mo.

Additionally, the automated system requires less of the employees' time, saving $2,784/mo, O'Toole continued.

Finally, the automated system eliminated three keypunch operator jobs for another $1,900/mo.

The 16K System/7 with two disks does the on-line processing, then periodically dumps data to the 370, which transmits back dispatch reports, manufacturing reports, labor cards and move tickets for printing at Flick-Reedy.

Flick-Reedy also has an IBM 129 keypunch attached to the System/7 and can use it to produce a rework routing package in real time, thereby quickly getting a rejected package back.

When a Flick-Reedy employee starts a job, he inserts his badge and a job-control card into the 2790 terminal, indicating he is starting that task.

Through this interaction with the employees, the system keeps track of job location and employee time devoted to it. The system is also programmed to monitor projected job completion. If the job falls behind schedule, the system issues a "search card" indicating its production-cycle location to the foreman.

A Watchful Eye

The following morning, the 370 prints out worker performance reports which serve as the basis for pay hikes, O'Toole said. Workers can't ignore the system or it generates search cards identifying them, he continued. "The system is much more pure and harder to fool" than the company's previous approach, he continued.

Flick-Reedy also is in the process of tying numerical control machines onto the System/7 which would store the programs on disk. When an operator indicated he was about to start a job, the appropriate program would be sent to the machine.

O'Toole said the processor should be able to drive the machines from 5% to 20% faster than paper tape and paper tape reader problems would decrease.

In response to a question on backup provisions, O'Toole replied workers would use space on the back of the control cards to write information for later keypunching.

O'Toole said the shop-control software Flick-Reedy uses cost $30,000 to $40,000 to develop. Mid-America took an IBM Field Developed Program (FDP) and reworked it, he said.

Dartmouth Experience Provides Educational Computing Case Study

By a CW Staff Writer

CHICAGO—Computers can be used much more effectively in the university environment than at present, and the experience with the Dartmouth Time-Sharing System (DTSS) proves it, panelists indicated here during a special NCC session celebrating the 10th anniversary of the service.

"Computing can be a new and fundamental intellectual resource," George Stibitz from Dartmouth told the meeting. But to date, he indicated, most colleges and universities are using computer systems primarily for administrative work and a small group of researchers.

In Dartmouth's experience over the past 10 years, he said, the heaviest use of the system has come from the researchers that are already being served by computers in most universities.

But for between 20% and 30% more money, he said, college systems could be equipped to handle other students and faculty members, if the Dartmouth experience is typical of the distribution of use found in other educational institutions.

Stibitz also added that most universities—even when they have computerization—don't take advantage of the full computer potential in education because they limit their efforts to computer-assisted instruction.

"This assumes that the only important role for the computer is in the delivery of instruction," he said, "which is still pretty much in the same form it would take with a human lecturer."

This leads to arguments on the economics of the systems—to determine whether human teachers are less expensive than machine-run courses—and does not address fundamental changes in the system, he indicated.

But, he said, "computers can open up whole new potentialities in education if they are treated as a fundamental intellectual resource much like libraries and books."

A computer system permits old ideas to be expressed in entirely new ways, he noted, using as an example Newton's second law of motion which previously required an understanding of calculus to comprehend.

Now, however, he noted, even non-science students can understand the law through the use of computer-generated algorithms which lead them through it and produce graphs clearly illustrating the points.

Algorithms can be used in similar ways to make complex ideas from many disciplines more accessible to general students, he indicated.

The system also allows students to check out hypotheses they develop against "real world" data stored in the system in such areas as sociology, he noted, giving them quick confirmation of the validity of their assumptions.

Chicago Chuckles

Douglas Maurer, chairman of the session on artificial intelligence, began the packed session without benefit of a microphone. The electrician was on a coffee break, prescribed by the union.

Test Team Needed for Control

Most Errors on Software Projects Come in Design Phase

By Don Leavitt
Of the CW Staff

CHICAGO—"It's easy to get a guy to write five lines of code. The tough part of software development is to know if they are the right five lines," Barry W. Boehm of TRW, Inc. remarked during an NCC session on the high cost of software.

He noted, however, that some studies have been made that suggest where errors arise, where time is being spent and the extent of errors in major projects being developed under current methods.

According to his figures, 64% of all errors found in one large project could be traced back to the design phase of the project, and only 36% of the errors came directly out of coding. In a study of a different but comparably difficult development effort, 33% of the time was spent on analysis and design, 17% on coding and a whopping 50% on testing.

Spending more time on analysis and design, he suggested, might well have cut the total project time and improved the final product, which is still not error-free.

In any case, an independent test team with an informal adversary relationship to the development team is "almost essential" if problem areas and errors are to be spotted before the final system is released to the world, he said. He also strongly advocated structured walkthroughs, during which the developer has to withstand critical review of his work by others concerned with the project.

John B. Slaughter of the Naval Electronics Laboratory Center made much the same points earlier in the session. He noted that software development has not yet come under the same engineering discipline and standardization successfully applied to hardware development and production.

Problems facing software developers, he said, generally revolve around quality, life-cycle costs and delivery schedules. All of these, he went on, tend to result from the uncertainties of specification, estimation, testing and documentation preparation "with which we're all too familiar."

The industry needs more uniform measures of performance so the user, the developer and the DP manager can have a better, hopefully more objective view of the project's progress. More interchange of theories, tools and techniques between DP installations is one way the uniform measures might finally be recognized and formalized, he added.

Judith Clapp of Mitre Corp. put the problem neatly: "The cost is too high when quality is too low." There have been a number of very expensive projects implemented, she noted, but they were successful and paid for themselves very quickly. In those cases, the cost was not too high.

Shifting the Burden

Cutting development costs may not be a solution in itself, however, since that approach may just put the burden of cost on the maintenance portion of the project life cycle. And correcting basic system flaws during maintenance is far more expensive than doing the job right the first time, she stressed.

To help do the job right the first time, Mitre is currently developing a Software Implementation Monitor (Simon) that should ultimately provide an orderly data base of all elements affecting project development. It will take into account budgets and time schedules, personnel time charges and use of computer resources during the development process.

It will scan the programmer's source code to determine if installation standards have been followed and monitor proposed test cases and test runs. In addition, it will check the reason for and number of compilations required by each programmer.

On the output side, it will review compiled code and test results to see what logical paths have been exercised and which have been missed. It will provide resource accounting of the entire project, Clapp told the session.

She admitted after the session that a number of things Mitre expects Simon to do are being done individually by packages already on the market. The real value of Simon, she said, would be its ability to collect all the data in a central data base for analysis by various interest groups.

'Structured Systems' Approach Essential To Successful Programs

By Don Leavitt
Of the CW Staff

CHICAGO—Technology has always outrun our ability to manage it, and even though "structured systems development" has a connotation of inflexibility, it is an approach that DP needs if it is ever to be considered a profession, Chairman Jack Shaw noted in introducing a session on just such orderly development concepts.

There is a need for a body of knowledge and a standard methodology that can be implemented within an installation, The Touche Ross consultant said, and this should ultimately gain user support for projects that achieve common business objectives, even if those objectives seem almost contrary to the user's first goals.

Historically there has been a "significant lack of communication and understanding" between the DP function and company management. This has been caused in part by the lack of a DP tradition, in part by the "suspicious" jargon of the DP staff and in part by the low level of DP management competence, he added.

A good standard methodology for system development must be independent of the project being developed, and it must be nontechnical and communicative to nonDP management. It must have built-in checkpoints for user review and predefined end products, Shaw opined.

Throughout, it must reflect the unique needs and operational environment of the organization involved, he stressed, pointing to this need as the main reason for the strength of the "not invented here" syndrome that dooms so many projects brought in from "outside."

Sticking to a single methodology—even though it might differ from that used in other installations—should provide benefits to the DP personnel as well

(Continued on Page 18)

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People the Key Element in Effective Data Base Management

By Don Leavitt
Of the CW Staff

CHICAGO—People problems have to be considered if data base management systems are going to become really effective. That was the message that came out of several of the papers at an NCC session on advances in data base management.

Many of the management information systems attempted in the mid- and late 1960s failed, according to Bernard Plagman and Gene Altshuler of Stanford Research Institute, because they were too complex for the users who had to work with them. The concept of an Integrated Corporate Data Base (ICDB) should resolve many of the old MIS problems, they said.

ICDB is formally defined as the consideration of the collection, storage, and dissemination of data as a logical, centrally controlled and standardized utility function. "Any attempted implementation of ICDB," they went on, "must include development of a data base, a data dictionary/directory system, data base administration, a data base management system and a user/system interface."

All of these terms have been used—and abused—for years. The user/system interface has had the least amount of effort applied to it even though it is perhaps the key element to an ICDB success, 'they said.

Two Points Not Transparent

Architecturally, the user/system interface affects all five ICDB subsystems, the authors noted, but two interface points in particular are not transparent to the user: the user languages and the decision process augmentation tools.

The user languages are difficult to create because the role of the user changes—sometimes dynamically—during development of a data base under the ICDB concept. Though the user is sometimes structurally independent of the data and concerned only with values and not how they are stored, at other times he may be structurally parametric or completely dependent on how the storage is handled.

The interface augmentation tools already exist in some respects, though they haven't been created for the interface problem per se. There is a need for three types of operands: arithmetic, graphical and modeling, the SRI researchers said. Interactive computer-aided modeling is a necessary adjunct to the use of arithmetic and graphical operands, they explained, because it allows the users to play "what-if" games while extracting and manipulating data.

MIS failed as a concept because it focused on "management." ICDB should succeed, Plagman and Altshuler contended, because it focuses on the decision-making process itself. With the stress on the user/system interface, it becomes symbiotic and the whole is greater than the sum of the parts.

Concern for graphical operands also highlighted another paper in this session that started with an overflow audience of some 1,500 people. Gerald Levitt and Beatrice Yormark of Rand Corp. described a prototype system for interactive data analysis, keyed to graphics on a CRT screen.

The Data Analysis System (DAS) is similar to some others, they admitted, but differs in that it provides the availability of a natural definitional language to manage and restructure the data collections, and the ability to quickly and easily form graphical representations of the data both in collected and restructured forms.

Graphics are important because of the various forms possible under DAS—including histograms, bar graphs, cross tabulations and stepwise regressions—because they come closest to capturing the user's "world view" of the data. Statistical tables or tabular reports simply do not come across as clearly as do graphics, the Rand authors argued.

Under DAS, the user has a class of operations which are executed on sets, for creation, deletion and display of the stored data. A second class of operations consists of statistical algorithms that can be applied to the data to reach the final, desired output format.

Good Programs Need 'Structured' Approach

(Continued from Page 17)

as the end users of the computer services, he said. It provides a basis for communication with users and a basis for performance measurement by management.

Giving management a means of measuring the staff's proficiency shouldn't be seen as a threat by real professionals, he went on. Instead, it is a way of showing that bringing in a major project on time and within budget "is a minor miracle, and not a fact of life," Shaw quipped.

Kenneth W. Hunter of the General Accounting Office (GAO) concurred. He noted that GAO and the General Services Administration (GSA) have organized a joint task group to survey existing cost accounting and control functions within government installations, with the possibility of promulgating new guidelines if they seem appropriate.

GAO already prescribes broad principles for application to system development efforts in the government, Hunter said. Even though individual agencies do the development work, GAO insists on three checkpoints—after concepts have been laid down, after design has been completed and before the tested system becomes operational.

The GAO/GSA task group will look at accounting and control within DP facilities to consider the effective use of equipment, within the cost-allocation practices of various agencies, and within the development of information systems along their entire life cycle, he said.

Norm Gelbwaks, vice-president of Chase Manhattan Bank, outlined the highly structured development process his installation has been using for the past year and a half. While it has clearly gotten the user involved—and far more knowledgeable about the capabilities and limitations of DP—the inclusion of an independent assurance group has not yet brought any discernible cost savings to the bank, he admitted.

Chase has a series of review committees through which every major new project must pass before it can be implemented, or in the case of a midterm review, continued. While technical considerations are part of the review process, basic bank objectives are also seriously considered. Top corporate management is on the final review committee and so is a representative of the user department, he noted.

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Saving the Taxpayers' Dollars

States Avoid 'Costly Duplication' By Program Exchange

By Nancy French
Of the CW Staff

CHICAGO—Transferability of programs designed in one state or agency for use in a similar function in another is a key way to avoid costly duplication and to save taxpayers dollars, sessions panelists told NCC attendees here last week.

"The concept of transferability—benefitting from others' mistakes—is as old as man himself," said Jim Trainor, acting director for the Division of State Systems Management in the Department of Health, Education and Welfare.

Transferability in data processing has been impeded for many reasons, including the contract characteristics proprietary software, a perceived lack of commonality of function and structure of systems and programs, nonuniform programming systems design and documentation standards, and the human inclination to look for dissimilarities rather than commonalities of systems, he said.

But perhaps most important in holding back program sharing is the Federal Government's failure to provide "leadership for transferability of systems," noted Charles Trigg, associate director of the National Association of State Information Systems (Nasis).

Donor Pays

Trigg pointed out that transfer and follow-on of programs can be costly to the donor. While the donor's commitment is only 5% to 30% of the recipient's, "a government entity often can't afford to give away a program—it doesn't have the staff to do this non-productive work."

"Timing can be critical," be suggested. "If you don't strike while the iron is hot, and too much time lags, people lose interest.

"Variation between governments often causes problems," he said. "Although the functions may be the same, structure and ordinances may be different. If ordinances have to be changed, it's a long-range problem," he admitted.

'Happy Medium'

Harold Casali, data processing manager for the State of West Virginia and a recipient of a payroll system developed by the State of Ohio, described transferring as a happy medium "between the textbook approach where you start from scratch and analyze, design, program, test, implement and document a program—and the other alternative of top-down or structured programming.

"Transferring programs can be four or five times cbeaper than designing new ones," be added.

He pointed out that transferability is especially helpful to state governments operating in annual budget cycles, susceptible to crises and political repercussions—"where it is important that visible results be obtained on a yearly basis."

Describing transferability as "still an art and not yet a science," Nelson Howell, project director for Nasis demonstrated that transferring is not without problems.

"The key," he said, "is to look for commonalities rather than dissimilarities.

"We make the mistake of designing from the bottom up—from the specific to the general so that, for example, the differences in structure of an account number is a major feature rather than a minor detail."

Transfers often take more ability than designing new systems for a variety of reasons, Howell pointed out. One arises when you "interface two data processing groups who are not aware of eacb other's problems."

In choosing a system, he recommended that a government agency select one that is outstanding from a conceptual point of view to end users—not necessarily from the data processing point of view—and then form a consortium to rewrite programs.

In this manner, software dependence can be eliminated because you're designing for multiple entity use, he said.

"I'm not recommending developing packages but rather structured system skeletons," he added.

Howell concluded that standardization of system design and documentation plus ANS Cobol language standardization should ease some of the problems surrounding transferability.

'Bottom Line' Called Most Important Item In Software Purchase

By a CW Staff Writer

CHICAGO—Users must buy software based on one key factor—the bottom line. Profit and loss for the company, which is, after all, the real end user, must be the guiding principle, Herb Cherry advised users attending an NCC panel discussion on software trends.

Stressing the wisdom of keeping the cost/benefit relationship in mind in DP decision-making, the vice-president and director of data processing for the Washington National Insurance Co. cautioned interested users that careful evaluation is the key in purchasing software packages.

"Given the present state of the art, there is no manual you can read to find out what type of software to buy to suit your particular problem," Cherry said.

"About 70% of the time devoted to selecting a software package should be spent on documentation," he cautioned, "or you'll end up spending that time further along when it may be too late."

Then he recommended formal, in-house procedures for evaluating the proposals solicited from suppliers. "Challenge the vendors to supply what you need—not what they want to sell you," he said.

Comparative Evaluation

The evaluation sheet should include a mechanism for assigning numerical values to various aspects of your needs. Only when satisfied with a proposal's ability to meet your every need should a selection be made, Cherry advised.

"Dollars and cents will be your final criterion, but only those systems that can meet your additional criteria such as benchmark test, documentation and review and, of course, financial stability on the part of the company, should be considered," he said.

(Continued on Page 20)

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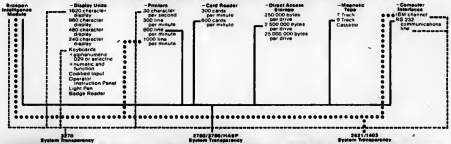

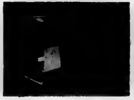

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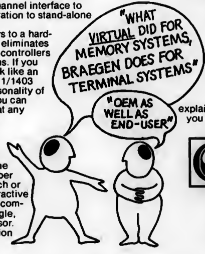
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Microprocessors Help

Intelligent Terminals Have Greatly Changed DP Environment

By Molly Upton
Of the CW Staff

CHICAGO—Intelligent terminals and their increased capabilities and widespread use are an example of how hardware technology developments have changed the DP environment, L. Charlie Hobbs of Hobbs Associates, Inc. told more than 400 attendees at the NCC session on intelligent terminals.

Panelists examined some changes that are likely to occur as a result of current cost tradeoffs and capabilities.

With recent advances in hardware technology, such as microprocessors, "we can afford to use hardware inefficiently" to make the overall system effective for the user, Hobbs said.

Hobbs defined an intelligent terminal as containing either a minicomputer or microcomputer where the stored program capability is available to the user.

With communications costs "at best staying constant" and software costs rising, any move to reduce communications and programming at the expense of more hardware "is a step in the right direction," he noted.

Although there is still a functional reason for maintaining a data base in one central location, "there is no longer a functional reason for centralizing the processor," he added.

With increased availability of LSI circuitry, economics do not favor centralization of processing. The criteria should be what is cost-effective for the user at a given point in time, he said, observing there will be a shift of more processor functions to terminals.

The capability of LSI chips and decreased costs force a reevaluation of economy of scale, the old precept that the way to run an efficient operation is to keep the CPU busy, added Marcian E. Hoff Jr. of Intel Corp.

In the next few years, he said, the difference in cost between high and low performance processors will decline.

Pressure On

As circuit technology develops, the pressure is on the peripherals makers to manufacture lower-cost units or higher-density storage units, he added.

Thomas B. Steel Jr. of Equitable Life Insurance Co. noted that although there will be much more processing at terminal sites, the data won't be moved out there because "we don't know how to design, maintain and update distributed data bases."

"Intelligent terminals can play a role in solving the people problem by putting more programming into terminals, thus allowing access by less trained users, he said. In addition, reliability of small systems should be greater than the 12 hours mean time between failures in larger installations.

The challenge, Steele said, is to think in terms of distributed processing.

This, he added, means a lot of rethinking.

One important implication of the use of intelligent terminals will be the need for modular programming, he said. At the outset of systems design, it may not be clear what functions will be distributed, and these could vary in the future, be noted.

Thus, to be prepared for changes, software should be modular, he emphasized.

One consequence, he added, could be the disappearance of Cobol, which is "not amenable to modular structures."

Query languages need to be more meaningful to users, he said.

Terminal Users Need Standards For Interfaces

By a CW Staff Writer

CHICAGO—Intelligent terminal users need standardized hardware and software interfaces, easy-to-use systems that are upward-compatible, have selectable data rates and user priority options for accessing the central processor unit, said C.W. Rosenthal of Bell Telephone Laboratories at the session on intelligent terminals.

Representing "the user" on the panel, Rosenthal noted the chief reason for the success of intelligent terminals is their ability to "be where the action is." He cautioned attendees about falling into the trap of creating a "separate domain" for the terminal, such as the computer room.

Designers should recognize the need for location of terminals in environments different from the computer room, he said.

Terminals should be easy to use, and should not require users to become "computerniks," he noted.

Features should be designed for a range of users, from the full time to the occasional user, who should be able to use the system without ingesting a 100-page tome, Rosenthal added.

For communicating with the CPU, "not all terminal users are necessarily equal in the corporate structure, he said, adding there should be some sort of priority option available to the user.

Terminal users need to operate in a relatively stable environment, where results are not destroyed as a result of CPU failures, he noted. Perhaps terminal users could be insulated from those using the CPU for software development.

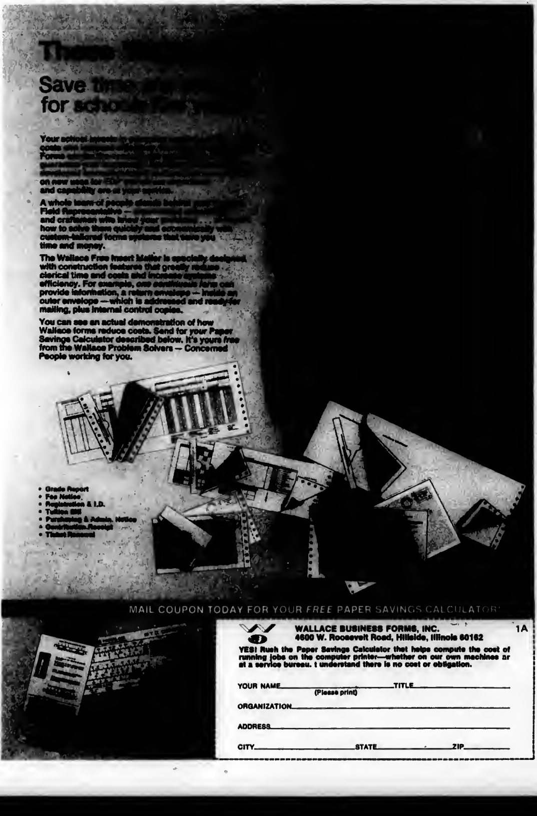
Rosenthal's plea for standards centers on his lack of faith in reliability of modified Phillips cassettes. He stressed the need for work on a four-track industry-compatible cartridge to replace the audio cassette.

Bottom Line Called Key to Software Buys

(Continued from Page 19)

The contract is the next most critical factor and should contain, in very detailed narrative style, a description of the functions, input and output, he said.

"Include a clear description of a demonstration test and let them know your understanding of an acceptance test. Also, a complete statement of cost, delivery date, place of delivery, penalties against the vendor in case of delays and a complete definition of their maintenance policy and policies on enhancements should be established. Only then will you be sure of what you've bought," he concluded.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Why Are Business Users Turned Off by ACM? Group Asks

By a CW Staff Writer

CHICAGO—What alienates the business data processing professionals from technical societies such as the Association for Computing Machinery (ACM)?

Past President Walter Carlson said last week a survey is under way to collect the opinions of ACM members on this problem; the project is of particular interest to ACM's Special Interest Group for Business Data Processing (SigBDP), as well as the association in general.

Carlson represented a long-range planning committee, whose goal is to meet the challenge of attracting business people to the association.

"I suspect that while we have a reputation for professionalism, BDP people tend to be turned off by ACM's academically oriented leadership," commented Brue Wrigley, chairman of SigBDP. "BDP professionals feel that academics don't understand what BDP needs, and they're right."

Up until a few months ago, silence reigned on the question of the relationship between ACM and BDP. But ACM's interest in becoming more responsive to its members has fostered a concern for the roughly 40% of its membership engaged in BDP.

The People Speak

Carlson's questionnaire to local ACM chapters will be compiled as soon as it's returned in the middle of May. Designed to provide a basis for a committee study of the problem, the survey asks ACM chapters whether BDP people in their areas feel deficiencies in the dissemination of technical information, and if so, requests suggestions on what ACM and other societies can do to increase the flow of technical knowledge.

The survey should also provide the committee with inputs as to which ACM programs serve BDP most effectively and which keep business professionals from joining the society. In addition, ACM wants to know what BDP people would like to see added or deleted from SigBDP's programs.

As far as Carlson knows, no technical society has ever captured and held the attention of professionals in BDP. In forming his committee, he plans to select 10 people who understand the requirements of the BDP professional and the personality of ACM. The committee will work to define clearly the principles and products of the society's relationship with BDP.

The long-range planning committee, rather than SigBDP, was given the task of defining the ACM-BDP relationship in order to illustrate the depth of interest ACM is taking in BDP, Carlson said.

Wrigley contends this puts leadership in a somewhat difficult position. "Leadership must be careful not to alienate those academics who feel the society exists for them by emphasizing BDP over other concerns," he remarked.

From Carlson's viewpoint, no danger of overemphasis exists, however. "We're not about to change ACM from a technical society concerned about computing to a professional society concerned about the welfare of 'computists,'" he said.

Distribution the 'Last Frontier' Where Computers Can Make a Mark

By a CW Staff Writer

CHICAGO—"Distribution is the last frontier in manufacturing where money can be saved through computerized operations," Jack Farrell told NCC attendees here.

Executive editor for *Traffic Management* magazine, Farrell chaired a panel dealing with "casebook" studies, developed from panelists' personal experiences in distribution.

Phillip Catalano, transportation director for Steelcase Inc., an office furniture manufacturer, described how computerizing the order processing system using CRT terminals allowed the company to provide better customer service.

"A desk order," for example, "could be changed to half with casters and half without, as long as they hadn't already been made as originally ordered," he said.

"Delivery points also could be changed. The overall end result was real flexibility, reliability and economy with a great reduction of paperwork," he added.

Ann Vaccaro, traffic manager for Carrier Corp. the Syracuse, N.Y.-based manufacturer of air conditioning equipment, related the firm's saving of $500,000 on a year's shipping costs through computerized planning and combined equipment deliveries where the computer showed it was possible.

Some rain fell on her ideal operating system, however, when the company replaced its Burroughs computer with an IBM 370/155.

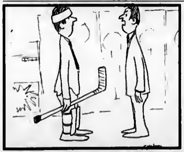
"The original program could not be adapted in any way for use on the company's new system," she said, so it was back to the drawing board.

Speaking for Phillips Petroleum, Charles Haas described how computerizing its system of rail car delivery cut down the number of cars needed to deliver the product. The firm reduced the number of new cars needed at a savings of $30,000 per car, Haas said.

"Except for the rail cars, we haven't made any huge savings in any one place," he noted, "but a series of little savings all along the way has the same overall effect."

Farrell commented that until the computer was applied to inventory and traffic systems, they were typically managed as separate and often competing functions. "Now management is willing to spend a little more money on freight, for example, if they see it's going to result in big inventory savings," he said.

Farrell predicted future applications in many other transportation-related areas, including factory and warehouse site selection.



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But Whose Fault Is It? Speakers Ask

Business-Oriented Training Receives Failing Marks

By Don Leavitt
Of the CW Staff

CHICAGO—Educational institutions—whether high schools, vocational institutes or universities—have so far done a bad job in meeting the needs of industry for business-oriented DP professionals, according to Gary B. Shelly, a consultant from Fullerton, Calif.

Speaking at an NCC session titled Business DP Education: "A decade of failure," he put the blame on the educators themselves. By contrast, Thomas J. Cashman of Long Beach City College complained about industry's failure to tell the educators what skills and attitudes it wants of the schools' graduates who are headed for DP careers.

The problem is national in scope and the solution must also be national, Denise A. Pierce of the Oklahoma State Department of Vocational and Technical Education declared. She called for a national professional association "dedicated first and foremost to the needs of business data processing teachers." Such an organization, she said, would provide a united front to gain "massive funding" for curriculum development projects and the creation of teacher training institutes. It would also gain assistance from industry in many areas, either through working committees or a national advisory council.

Cooperation and support from "industry-oriented organizations" such as the Data Processing Management Association (DPMA), ACM and the Association for Educational Data Systems (Aeds), would be sought by Pierce's proposed association.

She claimed that none of these groups had thus far provided any guidelines for business-oriented DP education, apparently disregarding the efforts of both DPMA and ACM two or three years ago. She specifically excluded ACM's Curriculum '68 since that was geared to computer science and not to the more mundane—but far more prevalent, she stressed—field of business DP.

Computers and Education

Aeds is an industry group, she said later, since it is concerned primarily with the business of running the schools rather than educating the students.

Pierce foresaw the possibility of establishing a medium of exchange, both written and verbal, for data processing teachers at all levels. In addition to a newsletter or other publication, she saw a need for annual, national seminars.

Pending creation of a national organization such as she proposed, Pierce asked the 250 or more people in the audience to provide her with realistic problems they might expect a new programmer to be able to handle.

If she could get enough problems, she would attempt to synthesize them into a usable set that she would then distribute to vocational education leaders in all the states, asking them to shape their curricula to fit the needs suggested by the sample problems.

It may not be an ideal solution, but without some drastic effort such as Pierce proposed, DP education will continue to stagnate. Then 10 years from now "we'll be able to get together again and look back on two decades of failure," session chairman Cashman admitted.

Computer Science Curricula Shifting At Universities

By Edie Holmes
Of the CW Staff

CHICAGO—With the advent of minicomputers, on-line computing, computer-aided instruction and the growth of DP in industry, emphasis in university computer science education has shifted. Some of the changes were the subject of an NCC session on the status of university computer curricula.

Director of computer science at Stanford University, Edward J. McCluskey is concerned with training professional designers in computer engineering.

Although he once felt a five-year program leading to a master's degree was essential, McCluskey now suggests students acquire undergraduate training in an area other than, but related to, computer engineering.

Those planning to be professional designers could then enroll in a more specialized program, such as the one offered at Stanford.

An intensive, one-year program in computer engineering, the Stanford program leads to a master's degree that is "blatantly professional," McCluskey said. "Our program is intended as terminal education; it should not be elected by someone interested in design research."

At present, McCluskey and his colleagues are working to incorporate more extensive business orientation into the program because so many of their graduates plan to design business applications.

A Bigger Frame

For Aaron Finerman of the State University of New York, computer science places too much emphasis on the theoretical, producing graduates overspecialized in one area.

These computer people are technician-scientists, he feels, unable to synthesize facts and events or understand the scientist's role in society. Finerman added, however, that technologically oriented programs have also failed at broad computer education.

He recognizes a need, therefore, for what he calls "professional problem-solvers trained to practice computing," echoing the NCC keynote speech.

By combining electrical engineering and computer science in an interdisciplinary mode, M.L. Dertouzos of MIT hopes to provide training in a field designed to last for several years. "We hope to give our students a shot of antiobsolescence," he said.

Using minicomputers in an on-line sys-

(Continued on Page 23)

Speakers Question the Validity of College DP Courses

By Edie Holmes
Of the CW Staff

CHICAGO—Sparring between audience and panel over whether colleges and universities are teaching what needs to be learned in computer science and data processing characterized an NCC session here last week.

Assuming the need for change, Chairman Julius A. Archibald Jr., a professor at the State University of New York, proposed that training of computer science and DP professionals meets the needs of neither students nor industry. While the panel tended to support his hypothesis, the audience wasn't so quick to agree.

One panelist contended students seldom become good programmers on the basis of university training. "About 250,000 new elementary Fortran texts are purchased by students every year and several thousand more are bought used," commented Charles B. Kreitzberg of City University of New York and the Educational Testing Service. "But I question how successful these students have been in their efforts to learn introductory computer programming."

Kreitzberg argued that teachers of programming don't really understand the psychological basis necessary for acquiring this skill. Picturing a continuum with "rote" learning at one extreme and "meaningful" learning at the other, he suggested that most programming courses depend too heavily on the former. People tend to forget facts learned by rote because they aren't remembered in any meaningful pattern, he noted, adding that students have difficulty applying facts learned in this manner to a variety of situations.

New Experience

This relationship between rote learning and the lack of quality programmers is presently no more than theory, but Kreitzberg hopes he will have hard data to prove his contention by this time next year. Eventually, he plans to devise a method of teaching which appreciates the fact that for most students, programming is not like anything they've done before.

Computers and Education

Gopal K. Kapur of the University of California shared the concern over failure to turn out competent programmers and directed the blame to universities that haven't sufficiently applied computer science to business DP.

Gerhard O. Mueller of General Electric Co. disagreed, however, stating that most programmers have been adequately trained in their craft. But he admitted programmers tend to be unprepared in such areas as estimation of job time and ability to express precisely what's accomplished by a particular program.

The lack of communication between industry and academia is the result of intransigence on both sides, Archibald said. Universities rarely devote instruction time to applied computer science, and industry can tend to ignore anything not directly associated with costs and profits, he said.

Universities perpetuate an excess of computer science theory at a time when industry needs to develop more DP applications, according to Archibald. He proposed academia reorder its priorities, placing major emphasis on applications.

Not all schools have ignored the need to make computer science interdisciplinary, and therefore, more practically oriented, however. Mueller cited the work done at Dartmouth College where the biggest user of the computer is the school of finance.

Archibald proposed an industry/university personnel exchange and advocated an internship program in which students would gain work experience in the computing field. While favoring the theory of a temporary personnel exchange, Mueller questioned the feasibility of such a program.

The internship plan can be implemented, according to Cynthia Harvey, an audience member and mathematics professor at Morgan State College, who related her institution's successful experience with internships in industry.

Computer Curricula Shifting Main Thrust

(Continued from Page 22)

tem, success of the MIT program depends on student/system interaction.

Students are required to spend two to five hours a week at the computer, where several games and a variety of experiments with large data structures are at their disposal.

A professor at the University of Illinois, Jurg Nievergelt, is concerned with computer applications in education.

"The best curricula in the world is worthless if the systems for delivering information to students are ineffective," said Nievergelt. "This is particularly true when you're attempting to teach a large number of people a skill."

Nievergelt suggested the need for active student participation in learning a skill makes computer-aided instruction a desirable alternative, particularly since advances in hardware and reductions in cost have made computers viable teaching machines.

Chicago Chuckles

As long lines queued up to take the NCC buses from downtown hotels to McCormick Place, smart cab drivers found them a good source of revenue. For the trip which usually costs around $1.50 for an individual, the cabbies were taking as many as five convention goers at 75 cents each—the same price as the bus.

The best-looking women at the NCC still seem to come to hear the presentations on education, even though they are penetrating every area of the business, at last.

There was a heavy influx of overseas visitors to last week's NCC, even though there were fewer foreign exhibits than in the past.

Afips announced that the 1975 NCC in Anaheim, Calif., would stress international aspects, adding the U.S. Department of Commerce has designated the 1975 show as one of the "top ten" expositions to be promoted by the government agency.

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Let's End 'Have Technique, Will Solve' Syndrome

DP Skills Only an Aid for Fundamental Business Problems

By Edie Holmes
Of the CW Staff

CHICAGO—"Have DP technique, will solve any company problem."

This is the attitude of too many line managers and end-user departments who treat the systems analysis function as a computer utility. And they relegate this function to the DP department, said Robert Hilton of Coca-Cola at an NCC session on utility computing.

"We have too many people in the systems area who perceive themselves as 'good time-share men' or 'good Cobol programmers,' or 'good operating systems technicians' or 'good data base management men,' "Hilton continued.

While these skills are highly valuable to a company, he stressed that they should not be treated as ends in themselves.

Systems analysis should be aimed at defining the fundamental business needs, rather than indulging the DP aspirations of a company, according to Hilton. He tended to agree with the session chairman, Dr. George J. Feeney of General Electric Co., that most companies should not necessarily divert their energies from their primary business function by attempting to run a sizable in-house computing utility.

Feeney contended that there must be limits to in-house computing, that the computer utility function should be outside the realm of many, if not most, business endeavors.

'Do Away With Programmers'

"Dr. Feeney has said, 'Sometime in the next five years a major company president is going to get up at an American Management Association meeting and proudly announce that his company no longer has any computers,' " said Hilton. "Similarly, I hope that within the next five years, my company and others like it will do away with all but a few positions now known as systems analysts and programmers and now assigned to the DP department."

Hilton would like to see systems analysis people placed in user departments like manufacturing, marketing, supply and delivery where they would begin to conceive of themselves as "good market researchers" or "good engineers" or "good sales forecasters."

The issue, Hilton noted, isn't whether to have the computer utility in-house or outside the walls of the company; at stake are perceptive definitions of a company's basic systems needs across the range of its operations.

Hilton stressed the need for a change in corporate attitude toward DP by sharing with his audience his impressions of last year's NCC proceedings.

"Paper after paper, panel after panel, expert after expert made me feel a stranger in this element, even though I've spent several years in information systems," he said. "I was much more comfortable with section II called 'Methods and Applications,' but couldn't help but notice this section was last and not first. It was only 90 pages compared with 816 for the science and technology section. I'm afraid many of us attending this conference carry that 10 to one bias of technology over user application when we go back and deal on a daily basis with the managers in our individual companies."

DP Has Hard Time Getting Doctors To Use System

By a CW Staff Writer

CHICAGO—"You can invent the best computer programs in the world, but if you can't get the physician to sit down at the keyboard, you haven't accomplished a thing," Dr. Richard Friedman, assistant professor of medicine at the University of Wisconsin, told NCC attendees here.

"Physician/computer interaction—the interface of the physician and computer—can make or break your program," he continued.

So Friedman undertook measuring the components of good computer/physician interaction.

Who Enjoyed What?

He interpreted levels of satisfaction through student/physician use or disuse of the system when diagnostic simulation problems were assigned. Those who enjoyed the use of the terminal so much that they completed more cases than were assigned were rated as satisfied; those who did only the minimum were rated as dissatisfied.

Seven factors emerged as important, to a successful physician/computer relationship.

- "Response time is important," he said. "If the machine responded in one to three seconds, the physician seemed satisfied. If it took as long as five seconds, the physician grew impatient," he added.
- Speed of the computer printout. Students stayed much longer when reports printed out quickly.
- Reliability of equipment. "If no breakdowns occurred, or if one breakdown occurred, the physician was reasonably satisfied."
- Access to the computer. When the terminal was in the hospital, the user was satisfied; when he had to leave the hospital to use it, he tended to do no more than the minimum. Similar results were produced in terms of scheduled or nonscheduled time. When the physician had to schedule terminal time and then got busy and missed an appointment, he was less likely to try again.
- Special entry codes. Greater use was observed when these were eliminated.
- Program errors. When text or logic errors began to appear, the physician began to disappear. Friedman related this to trust. "To depend on the system at all, the physicians had to assume it was absolutely correct, he said. When no textual errors were detectable, users were satisfied.
- The last test involved program comments. In their zeal to make the computer seem more human, Friedman said they inserted things such as, "Sorry, doc, wrong diagnosis," when an incorrect diagnosis was made. This type of "disrespectful or flippant" comment was found to be extremely unpopular—probably because the physician felt bad enough already that his diagnosis was incorrect, Friedman conjectured.

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Physician/DPer Provides Special Breed of Patient Care

By Nancy French
Of the CW Staff

CHICAGO—An elite group of computer professionals who are also physicians was treated to three highly complex presentations on computer-assisted patient care at an NCC session here last week.

Each participant set out to answer the question, "Can computers actually be applied successfully to health care?" Their answer was a resounding "Yes."

Dr. John Siegel of Buffalo General Hospital, Buffalo, N. Y., described his work in using the computer in intensive care situations.

Using a time-sharing system, "the health care delivery team can monitor and input details about a patient's vital bodily functions into a system through a terminal —in many cases by simply answering 'yes' or 'no,' or by inputting numerical information," he said.

To assure entry into the correct record, each entry must be accompanied by the patient's name, number, birthdate, weight and date of entry into the hospital, he explained.

The system is based on "digital entry rather than automation," he said, and the beauty of the system is that "nurses who input information at the end of each shift are forced by the computer to comment on vital details they may not have made clear in a narrative report to the doctor," he said.

The Crucial Interface

An important ingredient in developing an effective computer system is "complete understanding of each others problems" by both medical and computer science personnel. "Grind them out at the interface," he urged.

He admitted his system was not designed to provide hour by hour treatment information since data is entered into a patient's record only at the end of each eight-hour shift.

"In an emergency situation," he explained, "the doctor first must stabilize the condition of the patient, and only after that has been accomplished does he make decisions about long-term therapy, whether it be surgery or some other treatment," Siegel related.

A system being developed at Los Angeles, Cedars-Sinai Medical Center was described by Dr. James Ostlund as geared toward "creating a data base for future patient treatment as much as for providing assistance in immediate patient care."

Computers and Medicine

Ostlund described the capabilities of his system in terms of the complex monitoring it was able to perform on a patient who was in the process of experiencing a coronary infarction (heart attack).

"That man would surely be willing to say the computer is helpful in providing patient care," Ostlund chuckled.

George Gantner, affiliated with the St. Louis School of Medicine and also a county coroner, discussed a system designed to computerize autopsies, and the related paperwork and follow-up documentation of cause-of-death information for long-range use by physicians.

He identified as important benefits relief for the physician from the tedium of time-consuming dictation and preliminary organization of data that aids the physician's analysis.

"The system uses Fortran IV and a dictionary of 18,000 characters," he said.

"CPU time for each autopsy takes approximately 10 seconds, with printout taking about 15 or 20.

"Most data can be entered by secretarial and other clerical personnel. Only the final autopsy findings require entry by the physician in charge," he said.

Following the session, Gantner said of approximately 175,000 doctors practicing medicine in the U.S. today, only about 10,000 would have a working knowledge of this combined area of expertise.

Flexibility, Low Cost Seen Vital to Success Of Health Systems

CHICAGO—Information systems for health care can make life a little easier for patients and physicians alike.

But success of the interface between medicine and computer science rests on the assimilation of several discrete pieces of data giving an overall picture of the patient's condition and a flexible system which remains low in cost, according to three speakers at an NCC session on health and biotechnology.

Begun as a study of information systems in conjunction with the Appalachia II Public Health Department in South Carolina, the public health data system devised by John C. Peck solves a series of problems common to those who attempt to interpret health care data.

A professor at Clemson University, Clemson, S.C., Peck was concerned with designing a system which would provide physicians with social information pertinent to patient care. He ran into several problems, among them the sheer number of people to be included in the system, the wide geographic distribution of his target population, the lack of mobility of that population, the redundancy in data collection, the lack of standards in patient reports and the difficulties in writing oriented programs.

Using an IBM 370/158 and 32 terminals, Peck's data system can display patient information from family and surgical histories to medication and visit lists.

Peck spent $50,000 on the system in the course of a year. His expenses included the development of problem areas and the salaries paid to his staff. Now that social data is under control, he plans to develop a full medical record display.

Another system for auditing patient care has been devised by Robert Chalice, Olga M. Haring and Ronald Hochsprung at the Northwestern University Medical School, Evanston, Ill.

Designed to accomplish a variety of tasks, their system provides physicians with a concise, legible summary of the patient's medical records, identifies recommendations not carried out, notes omissions in recording, points out faulty medical reasoning, proposes corrective action and aids in the education of medical students.

Chalice and his associates expect to cut the costs of this on-line system in half by June 1. They hope eventually to be able

(Continued on Page 26)

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Special Equipment Opening New Vistas for the Handicapped

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—Computers can play an important role in opening educational and carreer opportunities for the physically disadvantaged, attendees at a session here agreed last week.

But special equipment needs to be designed to make the dream of widespread computer access for this group a reality, the speakers indicated.

The session illustrated the great deal of work in this area over the past year, with three papers devoted to new devices and systems that allow the physically disadvantaged to communicate more effectively with computer systems.

Gregg Vanderheiden, who headed a multidisciplinary team at the University of Wisconsin to develop the Automonitoring Communication Board for severely cerebral palsied children, noted that many of these children are extremely bright, though in many cases have never been able to communicate with the outside world.

As well as being unable to speak, he said, some of them don't have enough manipulative ability to use a typewriter, which makes it extremely difficult for them to get an education and impossible to make a living in a normal business environment.

Computers and Medicine

The computer could be a great aid for these children, he said, because they need one-to-one contact during the learning process which the computer could offer if an effective means of communication with the system were available.

He said development of the Autocomp system, as it is called, shows that "even severely handicapped children can be given a means to communicate with the computer and therefore open a great many opportunities for them in education and business."

Magnetic Switches

The "keyboard" is made of hard formica with a keyboard layout printed on it in addition to special function keys. Under all the keys are magnetic proximity switches so the child can spell out words by passing a magnet close to the letter.

The system is sensitive to a lack of motion rather than to motion, since many of these children exhibit a great deal of random movement. In addition, the magnet does not have to be directly over the letter, but just in the general vicinity to trip the switch and send the signal indicating that letter.

The system can be used with television monitors or any Ascii-compatible terminal, he said, and has a strip printer built in as well as a battery pack to make it portable.

The special function keys are used to generate words or phrases held in the system's memory, which increases the communications speed six times over the old way of spelling out words letter by letter, he said.

With such a system the children can communicate with people around them effectively, he noted, but emphasized that communication with computer systems ultimately opens significant opportunities to work at productive jobs from their homes.

Feedback for the Blind

Another new development described at the session involves the marriage of a voice synthesizer with a computer system to give the blind vocal feedback almost simultaneously with their entering of data through a terminal or typewriter.

Described by Dr. John B. Eulenberg of Michigan State University, the system can be used effectively for information retrieval and educational purposes since it allows blind persons to share with sighted workers or fellow students those experiences which cannot be effectively done with Braille.

The system can be used with a minicomputer, since the only information requiring storage is that for the phonemes of speech—which are limited like the alphabet, he noted.

The use of such devices, he said, may also lead to new ways of speech, since the patterns that can be generated are far more numerous than those generated for the printed medium.

Another new development is a computer-controlled display system used to teach speech patterns to the deaf, according to Raymond S. Nickerson of Bolt Beranek and Newman, Inc. "The computer provides versatility" to the system, he noted, adding that a great deal of work on similar manual systems had been done in the past.

The system is used to display speech patterns generated both by the deaf student and his teacher, giving the student a visual representation of his speech compared with more normal speech patterns.

Noting that one out of every 1,000 people is affected by prelingual deafness, Nickerson said simultaneous feedback allows the student to strive for the normal pattern immediately before him. From the display, the student can actually see how nearly he approximates the normal and how different actions can influence his speech pattern.

Flexibility, Low Cost Seen Vital to Success Of Health System

(Continued from Page 25)

to introduce patient records to the system for $4 and to update those records for $1. Initially, costs were $15 and $4, respectively.

Using a DEC PDP-11 minicomputer with 16K words of core memory, one high-speed paper tape reader/punch, three disk drives, two CRTs and one 100 line/min printer, Chalice's system costs in the neighborhood of $50,000. He keeps his system simple in order to reduce costs and maximize numbers of users, he noted.

Neither the patient nor the physician provides informational inputs to the system; all data is drawn from medical records, he added.

In contrast with the Northwestern University system, an integrated system for information processing and retrieval created by Kevin C. O'Kane and Richard J. Hildebrandt at Pennsylvania State University relies on patients and doctors for its data base.

Developed in connection with the Milton S. Hershey Medical Center, the system is intended as a research vehicle for medicine and computer science alike.

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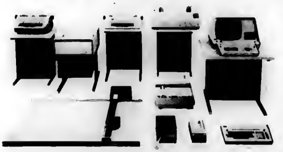

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But Catching Up Fast

Medical DP Seen Trailing Behind Other Applications

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—Medical data processing is relatively far behind other areas in applying and understanding computer use, Marion J. Ball of the Temple University Health Sciences Center told a session here last week.

But there is a great deal of work under way in the field with new programs and announcements at an ever increasing rate, she indicated.

Ball and fellow panelists Richard B. Freibrun of Compucare, Inc. and Bernard W. Bise of Peat, Marwick, Mitchell & Co. agreed that the early applications in the health care field have been limited to business-like applications for patient recordkeeping and billing.

Freibrun indicated that the major problem with hospital automation at the present time might be more in deciding what to do and what not to do in the area.

"There are a number of conflicting pressures which have resulted in an ambivalent attitude and a lack of decisiveness toward the extended use of computers in hospitals," he noted.

"On the one hand, the administrator knows that he will have to use the computer more extensively, but on the other hand he is unhappy at the prospect of greater expenditures in an area whose performance has been mixed at best."

A People Problem

The technology to develop hospital information systems has been available for several years, he noted, adding that the problem is not a technical but rather a management problem.

What is needed, he said, is "sound business analysis" of the cost and benefits of computerization in order to keep the costs of new applications in line with the expected benefits of the systems.

This type of analysis is mandatory in order to "make certain hospitals successful in their data processing programs," he said.

Ball indicated that the computerization of the health care community is now moving into a second stage of clinical applications.

In this area, she said, the clinical laboratories are presently the heaviest users of computers with between 200 and 300 hospitals in the country already automating their laboratories.

This is the first area to apply computers heavily, she indicated, since it was traditionally equipment-oriented and is a high revenue department in many hospitals.

At first this type of automation generally used time on the hospital's batch system for business applications, but now, she said, there has been a great deal of development in the area of mini and turnkey systems for laboratories.

Pharmacy applications are also growing, she noted, but added that the pharmacies in large hospitals are using systems mainly for business-type applications.

Another important area for hospital automation, Ball said, is in the medical records area, and she predicted the importance of this application would grow with the development of health maintenance organizations and professional standards review organizations.

One of the necessary steps in the automation of the recordkeeping function, she said, would be the development of standard numbering systems for patients, since today patients are identified by as many as eight separate numbers in a hospital recordkeeping operation.

First Things First

She stated in this and other areas of hospital automation there is a need for hospitals to first develop good management practices.

"All the computers in the world won't help" without good management procedures, she said, adding: "If we have chaos and just speed it up we just have more chaos."

In the area of radiation analysis, Ball predicted a large increase in applications over the next few years, even though most of the activity to date has been in the administrative and recordkeeping areas here also and not heavily in the clinical and diagnostic areas.

The ultimate developments in the hospital automation program will come, Ball indicated, when the two lower levels on the ladder (business applications and clinical applications) are married to make a true medical information system for hospitals.

To date, she noted, most movement in this area has involved several different functional approaches.

The first is the nursing station approach which puts this activity in the center of the medical information system since it is most related to direct patient care.

Another approach makes the medical record department the base for the system since those records can serve as a total, uniform medical data base. Here she noted a standardized system of recordkeeping would be needed to assure efficient computerization.

Other approaches currently under consideration, she said, involve the fiscal approach revolving around the admissions office, and the multiphasic screening approach which would use such testing as the basis for the data base on particular patients.

The panelists agreed that currently there is a great deal of resistance on the part of doctors and hospital managers to use computers, but this could be overcome with adequate education that would alleviate the emotional aspects of computerization.

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Editorials

'Well Done, Afips'

Commendations are in order for the American Federation of Information Processing Societies (Afips)—the sponsors—and particularly for Dr. Stephen Yau—the chairman—the forces behind the National Computer Conference and Exposition held in Chicago last week.

Such a mammoth production could not be planned or implemented without hundreds of other people, of course, but the officials of Afips have succeeded in carrying off a well-run conference, a truly herculean feat considering all factors: the show's size, duration (all week, not just three days), and the problems of working with outside support people.

It might appear "normal" for *Computerworld* to look for the negative aspects, too, but this time around—and so as not to place any minor problems out of perspective—it's just a "Well-done, Afips."

The Time Has Come

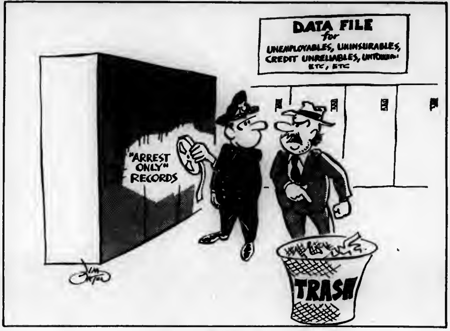
The idea of an association of computer users beholden to no manufacturer or other outside influence is an idea whose time has come.

There is a babble of voices that speaks in the computer community, but none to date really speaks with a unified voice for the computer consumer.

But users are the ones most affected by lack of standardization, rulings of regulatory commissions, the agonies of reconfiguration and the restrictions of legislation.

These issues cannot really be satisfied without the input and participation that can only be provided by the computer user.

We urge users to form a new group representing the user. It is long overdue.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for
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ETC, ETC
"ARREST ONLY" RECORDS
TRASH

'There's the File for It!'

Letters to the Editor

Misuse of Auto Data Not Unique Incident

The recent viewpoint by Herb Grosch calling for controls on the use of vehicle data bases [CW, April 10] recalls an incident that happened to me.

I lived in New Hampshire from 1967 to March 1972. In January 1972, I filed my 1971 federal income tax forms from New Hampshire. After moving to California in March 1972, I lived for two months at a temporary address before buying a home.

Early in 1973, the Franchise Tax Board of California (the state income tax authority) sent me, at my temporary address of the year before, a letter stating that their use of federal income tax files for 1971 showed I had not filed a California return for 1971, and that my tax liability was computed on the enclosed form. The enclosed form showed my correct gross earnings for 1971, a standard deduction, a "tax due" plus interest and penalties.

Since I was not a resident of California for any part of 1971, I clearly owed them nothing, but they should have been able to deduce that from my address (in New Hampshire) on the federal tax files they used. What was more mystifying was how the California taxing authority got my temporary address. Mystifying, that is, until I realized that the only contact I had with the state from that address was to register my car with the California Department of Motor Vehicles.

The state's algorithm for generating tax liability letters was then clear: match 1972 California car registrations with 1971 California tax payers' returns, and assume that unmatched registrations represent tax liabilities, which are then matched with 1971 federal tax records to determine the amount owed.

I find three major ethical and legal questions raised by this practice:

- The use of Social Security Numbers on car registrations to trace the tax status of individuals.
- The assumption of guilt by the state in sending a tax bill with demand for payment.
- Negligence in the use of federal tax files.

M.L. O'Connell

Nashua, N.H.

No Faith in Honeywell

Thanks for Herb Grosch's column in the April 24 issue. I left Honeywell less than eight months ago and one of the more pressing reasons was the feeling so aptly expressed in the column.

As a marketing consultant for Honeywell, I had occasion to see how the Wimmix thing was affecting our efforts – and it was as Grosch said . . . to the bank president and controller the Wimmix contract was stressed as a selling point (How could Honyewell "go under" as RCA and GE did with such large contracts?). However, there was an occasion when we were politely told to get lost . . . by the "concerned" computerpeople.

Honeywell has cut itself off from a segment (how large?) of the industry. I certainly would never go back to Honeywell. I could never compromise myself like that again.

Gary E. Miller

Maynard, Mass.

Solving Social Problems by Computer—Part 1

For Some Problems, DP Toolbox Is Empty

The following is the first part of a series based on a speech given at the New York Academy of Sciences, Oct. 9, 1973.

By Daniel D. McCracken

Special to Computerworld

Viewpoint

The late humanistic psychologist Abraham Maslow once said something to the effect that if your only tool is a hammer, you will tend to see the world in terms of nails that need pounding.

Computers are like that.

Computers offer a new tool of immense power that has already, in the space of less than a generation, worked its way into most phases of our lives, from credit cards to control of inventories, from hospitals to horoscopes, from weather prediction to war simulation. It is probably an uncommon project that does not have *some* kind of contact with computers.

It is not only natural but eminently reasonable that computers should have been pressed into seeking solutions to the pressing social problems of our day: overpopulation, group tensions, inadequate housing, environmental decay, the choking of our cities by highways, pollution, crime.

Speaking as a man whose entire adult life has been dominated by direct or indirect contact with computers, and as one who through a dozen books has had some impact on the growth of the field, I feel quite strongly about the use of computers in these ways. More specifically, I want that they be used just as effectively as possible in those areas where they do have a contribution to make, and I want – just as strongly – that they *not* be used where they are not the right tool. Let's not pound *every* problem with Maslow's hammer, when some of them are not nails.

Three Classes

I propose to offer a taxonomy of the application of computers for solving social problems, dividing them into three classes: First, those where a computer is demonstrably beneficial, without important adverse side effects; second, those that are more or less neutral, in a sense that I shall attempt to define; and third, those that are downright damaging and ought not to be done at all.

Much of this will no doubt seem fairly negative, so let me begin by emphasizing that I do believe there are many completely beneficial computer applications. The recently announced improvement in brain X-rays, impossible without a computer, is good for people, and that's that. I believe that the U.S. Social Security system is a good thing; it would be essentially impossible without computers.

Using computers to build better bridges is all to the good – if the bridges are really needed. Using a computer to produce a better search of precedents in a legal situation is all to the good – assuming that both sides have equal access to the new technology. Using computers to reduce drudgery of what is called "mere file clerking" is all to the good, if it is not more than offset by increased drudgery for hundreds of men and women entering the data into computer-readable form.

In these and a multitude of other examples, the use of computers offers the potential of reducing unproductive drudgery, bringing about relief of suffering, better administration of justice, more productive results of human labor. Sometimes the high goals become hopelessly lost in poor execution of the details, of course.

The vast majority of computer applications, according to my taxonomy, are ethically neutral. I see no reason to attach labels like "good" and "bad" to the goals of such applications as credit card billing, accounts payable, inventory control, payroll, travel reservations, medical recordkeeping, banking, space exploration, the search for subatomic particles, etc.

I call these ethically neutral, *from the viewpoint of what is being done with computers.* Whether they are good or bad depends on how one judges the larger venture of which they are a part. If one believes the improved control of department store inventory to be a good thing, or at least not bad, then a computerized inventory control application is good, or at least not bad. If poorly executed, any of these can turn out to hurt people.

Part II will focus on those applications the author views as ethically undesirable.

Daniel D. McCracken is the author of a dozen textbooks on computer programming and an observer of the social problems associated with computer technology.

The Dove That Ticked Counterclockwise: DP Failure?

By Miles Benson

Special to Computerworld

Does computing attract more than its quota of strange characters? Or does it just seem that way sometimes?

One of the strangest I knew was a guy I'll call Harley Dove.

Now on the surface, Harley wasn't too strange. He did have the annoying quality of hating work. If you measure programmer productivity in lines of code per day, Harley may be one of the few whose score flirts with the negative.

Sociology of Computing

He spent more time on the job reading the *Swinging Singles Gazette*, when management wasn't around, than he did cutting code.

And when he wasn't reading SSG (what *is* a trisexual, by the way?), he was deeply involved in philosophical discussions on subjects which varied from "Which came first, creation or astrology?" to "The prurient appeals in the Bible."

To tell the truth, Harley was a fun guy to have around. At Elko Electronics (that's a made up name too, by the way) there weren't very many guys at that time who could talk about more than mathematical lemmas and the intrinsic beauty of a well-designed circuit board.

By contrast, Harley's breadth of topics was like a day in Duluth with the smelters shut down. He and I whiled away a lot of Elko's time (at $6.73 an hour) avoiding subjects related to corporate products. And loving it.

It was hard on the conscience though. I used to go home at night feeling guilty about all that misspent time.

And that conflict began gnawing away at my innards until I finally ended up with a self-diagnosed ulcer, and an even larger problem.

I was made a lead. In spite of my frivolous pursuits, I had also pushed hard when I was working, and management put me in charge of five other guys.

One of whom was Harley Dove.

For openers, of course, I knocked off my own bull sessions with Harley. But Harley didn't change.

And now Harley was *my* problem. In spades.

A couple of months before, Elko had won a subcontract let by National Security for the avionics gear on its B750 bomber. And our group had software responsibility on that project.

That was a pretty tidy package of software – an assembler, a command-and-control language compiler, and a flock of radar, navigation and weapons programs that staggered the software imagination and promised to enrich Elko's till by several million.

There was one B750-sized fly in the corporate ointment. The schedules on that project were enough to eliminate the tortoises and agitate the hares.

Now I knew all that. So why did I assign Harley to code the assembler?

I guess I really haven't got a good answer for that one. Maybe I thought new responsibility would turn the dove into a tiger.

Anyway, it was bad news from day one. Harley was two weeks late for his preliminary design review, and a colossal six weeks off for the critical design review.

His specification documents read like the classifieds in *Swinging Singles*, only not as interesting. His flowcharts were disconnected and his code incoherent.

One night, weighed down by the magnitude of the problem, I woke at 2:30 a.m. with my mind churning. Maybe I hadn't really tried hard enough to deal with Harley as a person.

I had confronted him with his poor performance to no avail. Maybe it was time to find out what made him tick.

The thought that he seemed to tick counterclockwise cheered me a little – there was very little humor in my life then – and I drifted back to sleep more hopeful than in weeks.

The next day I called Harley over to my desk for a talk.

The story was a long time coming, and it came out in bits and pieces. But come it did:

The bulk of Elko's work was for the military. The B750 was military right up to its missile pods. And Harley was a pacifist!

Think about that a minute. It's sort of a "What's a nice guy like you doing in a place like this?" story, if you can see it clearly from all points of view.

"Why in the world are you working here?" I asked, incredulous.

"Because it's the only game in town," he answered.

It was true. In Elko's part of the world, if you didn't work for Elko you were unemployed. Well, not quite. But for computer people, those were the facts of life.

Well, I learned a lot about Harley Dove from that little chat. That there was more to him than conversational philosophy. That he felt things deeply.

And that he'd been deliberately minimizing his work output, and that of those around him, to justify his being employed there!

I learned one other thing, too. That I had to fire Harley Dove.

Harley Dove was a strange character all right. He had found that the only way to salve his conscience was to minimize the amount of help he was to his employer.

I wonder who he's working for now?

Poor Forms Contribute to Address List Problems

"Checking addresses involves real informational checking, not just data comparisons as you have shown on the mailing address printouts. And it is important in management information systems (MIS) as well as junk mail addresses."

These comments on my recent columns come from Jordan Brickman of System Design & Implementation, Lexington, Mass. Brickman is involved with computer file purifications, particularly in the bank and hospital area – and he has come up with some different ways of understanding the address matching problems involved in the consolidation of files for MIS implementation and maintenance. The problems revolve around recognizing that two records refer to one person, but instead of removing one of the addresses to produce a good mailing list, the idea here is to consolidate all the information from the two records into a single record.

The Taylor Report

By Alan Taylor, CDP

This consolidation is needed because many computer filing systems have more than one record which refers to a single person. This could occur when a clerk does not recognize that what appears to be a new account is actually a duplicate.

This record "inflation," which may amount to 60% in some cases, is more than simply inefficient. It can also be dangerous. For instance, when a hospital clerk fails to recognize that a patient is actually a repeat case – and not a new patient – the patient's records will be split into two areas.

This could mean that contraindications for some drugs may not get into both of the folders, and later on a return visit, when the patient is perhaps unconscious, only one of the folders may by pulled. This could result in a warning being in the records, but not being found in time to help the unconscious patient.

Lack of Trust

Industry also has similar problems. Brickman noted, however, that the major problem involved is not in the actual number of errors that occur. It is the lack of trust which can be created by even a small incidence of error. While he recognized the need for the data error correction techniques, such as those previously illustrated, he also uses a more humanly oriented cxample.

There are many factors in the outside environment that directly cause errors. Forms design, for instance, can result in one set of records being more reliable than another. A loan application in a bank which leaves plenty of room for a person to write his name will produce more accurate recording of the name than a credit card application at the same bank, where the form's design forces the use of abbreviations.

Other items that can affect the accuracy of a file are:

- Supervision and training.
- Hurry on the part of the person making the entry. (An overloaded clerk will make mistakes – more than one that has plenty of time.)
- Lack of apparent relevance.

Brickman told me there are more mistakes being made in the Social Security Number (SSN) than almost anywhere else. I suspect the reason is simply that the SSN does not seem to have much relevance to most of the forms; out of experience the data entry people have discovered it does not matter too much if they get the right or wrong SSN.

How the Similarity Routines Work

Codes: 3 or More = Match, 2 = Similar, 1 = Possible Error, 0 = Non Match

	No.	Name	Street	Sex	Birthdate	SSN	Welfare
Case A	0022196	William Gross	24 Andrews St.	M	09/04/17	034-04-5447	333507
	0022198	William Gross	24 Andrews St.	M	01/01/17	— — —	333507
	Similarity Factor	Family 3	First Name 3	Sex-Unit 2	Date of Birth 3		
Case B	2387818	Mary Hegerty	Grove St.	F	01/01/01	005-72-5643	
	2387898	Mary Hegerty	Park St.	F	01/01/01		
	Similarity Factor	Family 3	First Name 3	Sex-Unit 2	Date of Birth 3		
Case C	2579650	Yolande Josephs	15 Commercial St.	F	01/31/37		394152
	2579670	Yolande Silver	19 Tyler St.	F	01/19/37		394152
	Similarity Factor	Family 3	First Name 3	Sex-Unit 2	Date of Birth 3		
Case D	2713740	Joseph Carreale	262 Ashton St.	M	11/03/70	031-43-1436	
	2713739	Robert Carreale	262 Ashton St.	M	11/03/70	031-43-1436	
	Similarity Factor	Family 3	First Name 0	Sex-Unit 2	Date of Birth 5		
Case E	1069962	Donna M. Kelley	69 Derby St.	F	09/31/56	228-39-0247	
	1069972	———	———	F	09/31/56	228-39-0247	
	Similarity Factor	Family 3	First Name 0	Sex-Unit 2	Date of Birth 5		

The basis of the similarity routines can be seen from the headings. For each pair, four similarity factors are created, dealing with the family, the first name, the sex and the date of birth. Note that these are scored into one of four categories, varying from 0 for a nonmatch, to 3 for a match. The sex never gets more than 2 for being similar.

Case A – In the first entry, one of two records has a wrong birthdate and no Social Security Number. The use of the standard boundary for Jan. 1, 1917, indicates the record was made out in a hurry and that the correct date will be Sept. 4, and that these two records should be amalgamated into one.

Case B – In this case a more intricate error has occurred. The birthdate is incorrect by the year, rather than by the month and day, and the addresses are different. Still the similarities are high enough to match the two as potential duplicates. In fact it is quite likely that the two records do refer to the same person, rather than to sisters. However, this has to be checked out.

Case C – A human situation here. The woman concerned is married, changed her last name, changed her address. Again, made out in a hurry, one of the records had the correct birthdate, and the other had one of the standard "alibi" dates – this time being Jan. 31, 1937.

Case D – This is an interesting one, because on the surface it would look as though there is a Robert Joseph Carreale, whose Social Security Number is 031-43-1436. Addresses and birthdate all match. The first names do not match, but a number of people do use more than one first name. However, it was discovered that the Social Security Number does not really indicate a single person, although it officially does. A father's Social Security Number is often found on records for children, and in many cases, for the wife. In this system SDI uses the Social Security Number as a family indicator, rather than a personal one. In fact, on investigation, this case turned out to he two separate people who are twins.

Case E – A totally unexpected case here. During the running of one problem it was discovered that some 200 records had no name or address in the records. Later someone suspected that these had been wiped out during some computer test operations. Many of them were located and corrected through the similarity routines.

Brickman argued that in handling this type of problem the user must look at the detail in the records. He has evolved a method of matching the identification information on two records to develop both a comparison threshold position and a comparison score. These, taken together, indicate whether there is sufficient likelihood of a duplication for the matter to be referred to human check.

The threshold information is gathered from an examination of how much information is available. Thus, a record that only has very basic data will have a low threshold, around four or five, whereas one that is more enriched with details such as Social Security Numbers, wel-

(Continued on Page 30)

From Budgeting to Production Monitoring

DP Takes on Challenging Role at Stratford Festival

By Betty Jane Wylle

Special to Computerworld

STRATFORD, Ont. – At the Stratford Festival Theatre here the computer is the artistic director's best friend. Since 1969 it has been handling many of the complex problems of what many theater critics have called the most important repertory company in North America. The theater also has an average annual budget of $3.5 million spread over three theaters and off-season tours, 10 months of the year.

The theater's use of the IBM 360/20 was originally developed by the former general manager and refined by the present one, Bruce Swerdfager. With a permanent administrative staff of about 70, the theater expands to a payroll of almost 700 at the height of the season. Swerdfager said it used to take one person on a bookkeeping machine 14 hours to do the payroll. The computer, which does it in 15 minutes, handles only the accounts payable; in the theater business there are no accounts receivable because tickets sell for cash.

But the complexities of the business are far more intricate than mere general ledger work.

The theater's sales tax analysis is also computerized. The Stratford Festival Theatre produces all its own costumes, props, sets, everything required for nine or 10 productions per year at its three theaters. It is therefore classified by the Canadian Government as a manufacturer, though the goods manufactured are for its own use. There is no tax on a purchase order for materials to make the costumes or props; when the invoice comes in, it's tax-free. But the federal and the provincial tax must be calculated on each finished product, based on the cost of materials and labor.

The computer is also used not only for a cost analysis of each proposed production, and for budgeting, but also to keep a close check on each production in the process of being mounted.

Each of the plays to be presented has a budget broken down into design, costumes, props and actors. These categories are further broken down into weekly estimated costs.

Strict control must be kept on all the design and production costs as the costumes and props are being created. If a designer suddenly feels he wants a mosaic floor on the stage, he and his artistic director must know whether they can afford it. Since the entire budget has been computerized, broken down into weekly estimated expenditures, the administrator, designer and artistic director can tell by the weekly printouts whether actual expenditures are in line with estimated expenditures both for that week and for the year to date.

Even those purchase orders without an invoice (and without sales tax) are recorded immediately.

This kind of eagle-eye surveillance does not inhibit the creative spirit of an artistic director. Swerdfager explained, "It means that an artistic director who is well-informed concerning expenses knows where he's at. If he feels it is artistically necessary to do something extravagant and uncalled for in the budget, he can go to his administrator or his board of directors and ask for more money. But he has the information to make his decisions without flying blind."

The planning committee of the Stratford Festival Theatre also uses the computer to aid in the season's programming. This in no way hampers the artistic director's artistic freedom but it does encourage him to think in saleable combinations of plays. Anticipated revenues on suggested plays are projected in combinations of three and four. If one play indicates a lower return, but the other two will compensate for and carry it, it may be retained. If three in combination promise a dismal income, other combinations are tried. The Stratford Festival Theatre is subsidized by the Canada Arts Council, the Province of Ontario Council of the Arts, and private fund-raising, but draws 70% of its income from the box office.

The biggest job of programming the computer is in the preparation of the budget, broken down as it is into weekly figures. It takes Gerry Corner, the budget comptroller, working on special sheets designed by Swerdfager, almost two months each fall to prepare data to be fed into the computer. Since the software was not developed exclusively for the Festival Theatre, the owners of the computer spread the charges for it among some 50 clients.

Frank Jaglowitz of the accounting firm which owns the 360 is quick to stress that the theater developed the system for itself.

"I think that the financial control the festival instituted is about the best I've seen anywhere, for almost any type of operation, not just a theater," he said.

Poor Forms Design Creates Bad Lists

(Continued from Page 29)

fare numbers, full dates of birth, etc., will have a higher threshold, say around nine. Then, when the number of similarities is counted and quantified – say to a count of seven – the decision will be made on whether to print them.

In the illustrated printout some of the results of this technique can be seen with pairs of names from different parts of the master files listed alongside each other. (The ones shown have all scored over the threshold.)

It is interesting to note that some conventions seem to grow on how to enter incorrect data. This is particularly seen in the birthdates; while the year is generally accurately transcribed, dates seem to be entered by boundaries – that is, the first of the month or the last of the month.

I think the Brickman technique of using data from the files in order to check out the accuracy of the pure identification data is a good one. Certainly from the point of view of getting individual files linked on a centralized basis, it is the best that I have seen. However, there may be better. Perhaps if we had paid more attention earlier to the problems of junk mail, we would now have a better way of centralizing our files!

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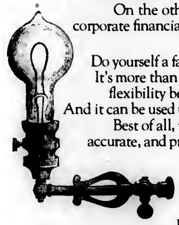

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Typical User Processing Cycle

Data Gathering	Closing Cycle Detail Trial Bal P & L Balance Sheet	Other Reporting Budget Reporting Comparative Reports Departmental Reports	Analysis

Software International System

Data Gathering	Closing Cycle	Other Report	Analysis

British Look at Monitoring

MANCHESTER, England – The National Computing Centre is backing a review of the state of the art of DP efficiency monitoring in the UK. Under way since January, the project is focusing on measurement and evaluation of the use of "various DP resources and activities" including hardware, software and people.

The center is a nonprofit organization supported by industry, commerce and government. It is dedicated to promoting the wider and more effective use of computers in the UK.

The project is designed to collect information on what is being done in the areas of measurement and evaluation – and what needs to be done to get answers to some "obvious" questions – or to set standards of efficiency against which any manager can judge his installation.

Earlier this year, the working party in charge of the project announced it was "keen to contact organizations who feel they could usefully contribute – particularly in regard to performance standards, composition of the DP expenditure budget and financial accounting aspect of DP, and knowledge and experience of software and other aids to efficiency monitoring."

The initial publicity has produced a "gratifying response" from a number of user installations, both large and small, and covering a wide range of industry sectors. It has also revealed a number of informal groups and working parties with an interest in this subject, center spokesman G.B. Bleazard added.

Apparently, however, no attempts have been made to contact groups concerned with computer performance evaluation in other parts of the world.

Ultimately, the findings and recommendations will be embodied in a report from the working party, the center said, but no timetable for completion of the project or release of the report has been announced thus far.

Bleazard is with the Methods and Techniques Division of the National Computing Centre, Quay House, Quay Street, here in Manchester M3 3HU.

Operations Sphere Takes Lead, Moves Utility Into IMS World

By Don Leavitt
Of the CW Staff

WESTBOROUGH, Mass. – Top management's "tidal wave of support and enthusiasm" for New England Electric's DP operations staff – which includes systems programmers – has been vital to the utility's conversion from an IBM 1400-oriented installation to one based on a pair of large-scale 360/50s, according to senior technical adviser Gary Wirth.

Three years ago operations was seen as the end of the line in DP, doing nothing innovative to enhance the way systems worked. Now, however, operations provides leadership for the electric company's growing involvement with DP, including an IMS-based teleprocessing network, Wirth said.

"We're getting into some internal measurement efforts now," Wirth said, "but the biggest contribution the staff has made toward optimizing the workload has been in the setting and enforcing of standards for new jobs being added to the workload."

At first, there were too many obvious externals that needed attention for the staff to be too concerned about "bits and bytes," he went on, noting that concern for human factors was seen as a first priority. System level software was of secondary concern and problem program enhancement least important.

However, as standards have been developed, the attitude toward work being done has been reversed, Wirth said. Originally, the 1400-based jobs "belonged" to the operations department and the end-user departments didn't necessarily have to know anything about how the work was done.

Now, however, the using departments are required to learn their systems. During development of new applications, user attendance at planning meetings is required, as is user sign-off at various checkpoints in the development cycle.

New projects have to pass five separate reviews before they are moved – on probation – to production status. The probationary period ends, Wirth explained, only after the new jobs have had three successful production runs, covering different cycles – not just repeats of a single cycle, he hastened to add.

'Fire-Fighting'

Existing inefficiencies are studied by the staff with monitoring software from Pace Technology, but these efforts are basically fire-fighting expeditions, without any long-range goals. Within the next month, they expect to start using one of the Capex Corp. optimizers to strip unproductive object code from some of their Cobol programs.

IBM has done some monitoring for New England Electric using OS/PT1 and SMI, "but as you might expect, they showed us only the results they wanted us to see, which 'proved' that a 370 would solve our problems," Wirth said.

The human factors the staff has focused on include documentation, particularly as it relates to job setup, data control and restart procedures. New England Electric used to run an "open shop" in which programmers had the freedom of the computer room – and the chance to get better service through friendship with the operators.

Now the system has been enhanced by New England's staff so the operators have very little to do with the system, and under those circumstances, clear, easy-to-read documentation is "vital," Wirth said, admitting that such a thought was certainly not original.

The system standards the company has imposed cover such areas as hardware layout, data set contention, media choice (tape or disk) based on size of file, as well as function, maximum core size for each program and, "of course," JCL conventions. The internal JCL code has been altered, Wirth noted, so that IMS jobs can be run under either teleprocessing or batch mode, and the job stream is changed dynamically and transparently to the operators.

'ICS' Said to Beat IBM VM/CMS Sort

NEW YORK – Users working in Assembler, PL/1 or Cobol under the time-sharing Conversational Monitor System (CMS) environment of IBM's Virtual Machine Facility (VM/370) can handle a variety of sorting applications with the Integrated CMS Sort (ICS) system recently introduced by Standard Data Corp.

ICS is compatible with IBM's OS sort, but much more flexible, Standard noted, explaining that at present under CMS IBM provides a utility that can only sort ascending sequence as a stand-alone command.

ICS, on the other hand, allows the user to sort both ascending and descending sequences. It functions as a stand-alone utility, as support for the Cobol SORT verb, or as a routine that is Callable from Assembler or PL/1 programs.

ICS supports both fixed- and variable-record formats. User-written routines such as those used with Exit 15 or 35 can supply or receive records when ICS is invoked by a Cobol, PL/I or Assembler routine.

ICS utilizes the front-end logic of IBM's sort so control statements, control field definitions, formats and restrictions are supported. The system shifts into Standard's sorting logic after the initial screening has been completed by IBM's utility.

In addition to being more flexible, ICS is said to be much faster than IBM's sort. The independent's sort system can run from two to 12 times faster than the sort command distributed with IBM's CMS, Standard claimed, noting, however, that the actual run-time of ICS is dependent on size of virtual core, number of records and the sort key.

ICS can be delivered immediately and installed in less than an hour, the company said. The system sells for $11,500.

Standard Data is at 1540 Broadway, 10036.

System 2000, Igim Now Up on Infonet

EL SEGUNDO, Calif. – Enhanced versions of MRI's System 2000 and TRW's Generalized Information Management (Igim) system have been made available on a production basis on the Infonet time-sharing service, according to Computer Sciences Corp., the Infonet vendor.

Together with Infonet's own DML data base management system, the newly installed systems provide users with a range of differing capabilities, applicable for different situations, CSC noted.

'Cupp' Covers Both Hasp and SMF Data

MILWAUKEE – OS/360-370 users have still another extraction and reporting package with which to analyze data captured by IBM's System Machine Facility (SMF) and Hasp accounting routines. The Computer Utilization and Performance Program (Cupp) is now available from the Data Systems Division of A.O. Smith Corp.

The Hasp-based reports set Cupp apart from other similar systems, the vendor said. With the Hasp reports, users gain detailed job turnaround analyses, remote terminal I/O summaries and lost time resource analyses by initiator; by day and by shift or class of activity.

SMF Shows CPU Use

Reports from SMF data include CPU utilization, batch job-step resource utilization summary, multiprogramming efficiency and device utilization. The report set is rounded out with a lost time resource analysis, which can show when core or device allocation becomes a bottleneck and when daily "traffic jams" occur.

Cupp adds nothing to a user's overhead during normal operations since it utilizes SMF and Hasp collection routines. The extraction and reporting portion of the system is made up of five programs and uses 120K bytes of memory.

The Cupp software, written in PL/1, is available for $3,000 from 8651 N. Port Washington Road, P.O. Box 584, 53201.

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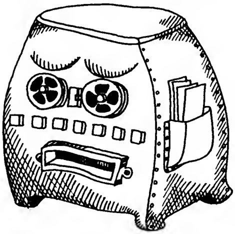

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Varian Has Firmware To Speed Fortran...

IRVINE, Calif. – Varian V70 users can have faster, more compact code under both Fortran IV and assembly language programs with a library of 23 microprogrammed routines, including byte and stack instructions, now available from Varian Data Machines.

The routines in this firmware library, loaded into the system's writable control store, accelerate program run-times by decreasing the time needed by frequently performed functions. In Fortran, Varian noted, this would include floating-point operations, DO loop overhead and parameter passing.

Speed of floating-point operations with the package is four or five times faster than handling the same operations with conventional Fortran subroutines, the company claimed.

Branch-to-control store instructions can be executed in either foreground or background mode under the Vortex operating system.

The firmware package, cataloged as Model #70-9561, can be purchased for $300, including source deck, from Varian, at 2722 Michelson Drive, 92664.

...And DEC Package Outperforms 360/30

MAYNARD, Mass. – DEC's extended version of Fortran IV for the PDP-11, Fortran/RT-11 recently performed a series of matrix inversions at a faster rate than an IBM 360/30, according to a DEC spokesman.

The new system includes an optimizing compiler that enhances run-time performance by eliminating redundant coding, he explained. The programming of Fortran/RT-11 is "quite efficient" allowing 200 to 300 lines of Fortran code to be stored in 8K of memory, or more than 2,000 lines can be stored in 28K.

RT-11 supports a wide range of peripheral devices and includes "a full complement of program development tools," DEC said. Since the new processor package works under the operating system, it has access to that system's on-line editing capabilities of both source and compiled programs, if desired.

Fortran/RT-11 does not require DEC's floating-point processor (FPP) to function. Nor does it need the FPP to outperform the 360/30, DEC emphasized, though the margin of improvement is much greater with the floating-point hardware than without it.

Fortran/RT-11 runs on any PDP-11 with 8K to 28K words of internal storage and a mass storage peripheral, and costs $700.

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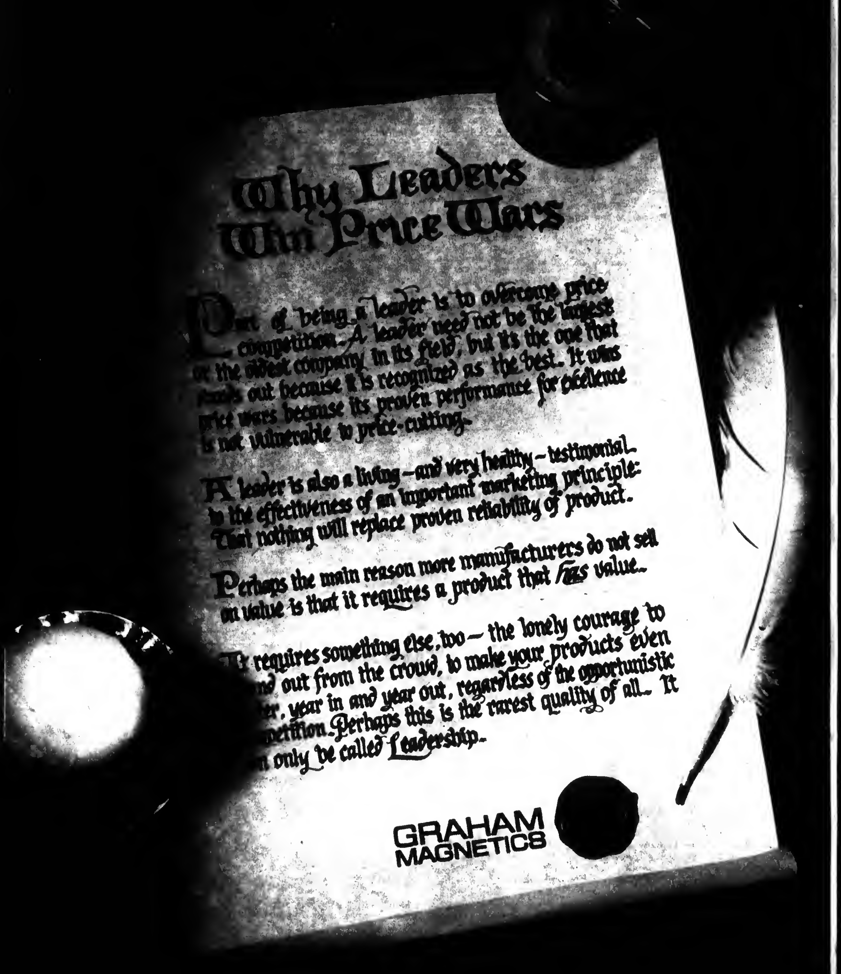

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SUMMER SEMINAR SCHEDULE 1974

ADVANCED PROGRAMMING TECHNIQUES

June 24-28: New York City
July 15-19: Chicago
August 5-9: Washington, D.C.

COURSE OBJECTIVES

This course will acquaint the programmer with a wide range of practical programming skills which he would not receive in a "basic" training course offered by most hardware manufacturers, industrial training organizations or computer science courses. The intention is for the student to leave the course with practical ideas that can readily be applied in his day-to-day work. The advanced techniques presented in this course are applicable to any computer installation using any of the major programming languages.

The couse consists of two major segments: how to design a good computer program, and how to make use of advanced techniques for program implementation. The student learns these techniques and concepts through a combination of intensive lectures, discussions, programming exercises and case studies.

The first part of the course concentrates on various topics in the area of *program design.* The student is given specific techniques for designing programs in a top-down fashion; for writing modular programs; for writing structured programs; for writing programs that can be understood by others. The second part of the course concentrates on a variety of *implementation techniques.* Included in this discussion are optimization techniques, data structures, dynmaic storage allocation, decision tables, testing and debugging techniques and searching techniques.

INTENDED FOR programmers and analysts with at least six months of programming experience. Also recommended for those responsible for training and educating programmers.

COURSE MATERIALS include the 400-page draft manuscript, *Program Structure and Design,* and the 350-page manuscript, *Advanced Programming Techniques,* both by Edward Yourdon. Copies of approximately 450 slides and visuals used to support the text material will also be provided.

TOPICS covered will include: • Characteristics of a Good Computer Program • Top-Down Program Design • Modular Programming • Structured Programming • Programming Style: Simplicity and Clarity • Defensive Programming • Testing Concepts • Debugging Concepts • Program Optimization Techniques • List Structures and Data Structures • Dynamic Storage Allocation Techniques • Decision Tables • Searching and Table Lookup Techniques.

STRUCTURED PROGRAMMING

June 24-28: New York City
July 15-19: Chicago
August 5-9: Washington, D.C.

COURSE OBJECTIVES

For almost ten years, computer scientists have been discussing and refining a relatively new approach to programming and program design – concepts referred to as *structured programming* and *top-down program design.* A more rigorous and well-disciplined version of "modular programming" and other *ad hoc* programming methods, it promises significant improvements in development, testing and maintenance of computer programs. Yet, many programmers have never heard of structured programming. Others know of the concept only in the highly oversimplified (and dangerous) context of eliminating the GOTO statement. It has been our experience that the *concepts* of top-down program design and structured programming seem relatively straightforward; however, the *techniques* of structured programming (e.g., "How do I eliminate the GOTO statement from my master file update program?") are considerably less obvious. A *belief* in structured programming is possible only after the student has practiced it under the supervision of an experienced instructor.

This course teaches the concepts and techniques with discussions, lectures, case studies, a major programming exercise and workshop sessions. Specific rules and conventions are established. With this practical experience, the student should immediately be able to apply the principles of top-down design and structured programming.

INTENDED FOR programmers and analysts with at least six months of programming experience. Senior programmers and managers are especially welcome, as they are likely to find their philosophies of program development severely tested. The material is also useful for training managers responsible for teaching good program design.

COURSE MATERIALS include a copy of the 400-page draft manuscript, *Program Structure and Design,* by Edward Yourdon. Copies of approximately 200 visuals and slides will also be provided.

TOPICS covered will include: • Top-Down Program Design • Top-Down Coding • Top-Down Testing • History and Theory of Structured Programming • Techniques • Practical Considerations • Project Organization for Structured Programming • Clarity of Style • Defensive Programming

ADVANCED SYSTEMS DESIGN

June 24-28: New York City
July 15-19: Chicago
August 5-9: Washington, D.C.

COURSE OBJECTIVES

This course presents an intensive and unified discussion of the most critical elements of designing and implementing advanced computer systems with today's third and fourth generation computers. Much of the emphasis is on real-time systems and on-line systems. With lectures, discussions and case studies, the course warns of the practical problems and pitfalls that are likely to be encountered in application programs, data bases, operating systems, recovery and reliability, testing and debugging.

The course will provide analysts, programmers and managers with a variety of techniques for configuring hardware, developing application programs, designing data bases and tuning operating systems for a variety of batch, real-time, on-line and time-sharing systems. General principles and philosophies are stressed. As a result, the seminar should be of value to both the business-oriented and scientific-oriented student.

INTENDED FOR data processing managers, analysts and programmers concerned with the design, implementation and management of advanced computer systems projects. Participants are assumed to have a basic familiarity with and understanding of current computer hardware and software.

COURSE MATERIALS include the text, *Design of On-Line Computer Systems* (Prentice-Hall), by Edward Yourdon. In addition, students will receive copies of the slides and visuals used to support the text. Case studies and examples will also be distributed.

TOPICS covered will include: • Definition of Important Terms and Concepts • Classification of Common Advanced Systems • Review of Hardware Requirements • Design Calculations • Statistics and Performance Measurement • Developing Application Programs for Advanced Systems • File Organization and Data Bases • Operating Systems • Error Recovery and Fall-Back • Testing and Debugging • Case Study

STAFF BIOGRAPHIES

EDWARD YOURDON, President of YOURDON Inc., a New York based software and consulting firm, is an authority on program design and on-line computer systems, having lectured and consulted throughout Europe, Canada, Australia and the US. His book, *Design of On-Line Computer Systems* (Prentice-Hall), is being used as a textbook in numerous universities. He is currently completing another book, *Advanced Programming Techniques,* and has written articles for *Datamation, Modern Data, Computers and Automation* and IEEE. Mr. Yourdon has worked at DEC, GE, several small consulting firms, and as an independent consultant. He has a B.S. in Mathematics from MIT and has done graduate work at MIT and Brooklyn Polytech. He also teaches graduate-level courses at RPI and UCLA.

ROBERT ABBOTT is a Project Leader at Equitable Life Assurance Society, as well as a consultant to YOURDON Inc. As Project Leader, Mr. Abbott is fully responsible for the design, implementation, and maintenance of an on-line management information system on IBM 370 equipment using IMS. He has worked on both IBM and RCA equipment, and was responsible for the installation of the first minicomputer on a major corporate system using a Datapoint computer. Mr. Abbott graduated from City University with a B.B.A. in Management.

JOHN MCGEACHIE is Director of Data Processing at Dartmouth College, as well as a consultant to YOURDON Inc. He has recently completed the development of an on-line management information system for Dartmouth Time-Sharing System; he has also worked for GE and for a consulting firm where he was Director of Technical Services. Mr. McGeachie holds a B.A. in Mathematics from Dartmouth College, where he is a candidate for an M.B.A. He has published several papers in the *Communications of the ACM,* the Proceedings of the SJCC, the American National Computer Conference, the 1973 IEEE Symposium on Computer Software Reliability, and the Proceedings of the 1973 Fall EDUCOM Conference.

STEPHEN GARLAND is an Assistant Professor of Mathematics at Dartmouth College, as well as a consultant to YOURDON Inc. Mr. Garland has written several ALGOL compilers, participated in the development of the original Dartmouth Time-Sharing System, and was a visiting assistant professor at UCLA in mathematics and computer science. Mr. Garland graduated from Dartmouth College with a B.A. in Mathematics, and holds both an M.A. and a Ph.D. from the University of California at Berkeley. He has published extensively in such periodicals as the *Journal of Symbolic Logic* and the *Journal of Computer and System Sciences.*

REGISTRATION FEE for each seminar, including all course materials and luncheon, is $600. Payment is due prior to the beginning of the seminar. Enrollment is limited to preserve the integrity of the course and to assure effective instruction; prompt registration is recommended to guarantee space availability.

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Data Briefs

Three Penril Data Sets Replace Bell 201B Modems

ROCKVILLE, Md. – A series of 2,400 bit/sec data modems has been introduced by Penril Data Communications, Inc. The series, comprised of models 2400B1-A, 2400B1-B and 2400B1-C, is compatible with the Bell 201B data set and is intended for operation on dial-up, Series 3002-C2 or unconditioned transmission facilities.

The 2400B1-A modem is the lowest cost model of the series and operates using a CDT manual data access arrangement. The unit features instant synchronization, instant carrier recovery and rapid RTS/CRT response. The modem also features analog loopback and local digital loopback diagnostic capabilities.

The 2400B1-B modem is identical to the 2400B1-A with the exception that automatic answering capabilities are provided when used in conjunction with either a CBS or CBT data access arrangement.

The 2400B1-C modem features an addressable remote test diagnostic capability which enables the operator at a central site to select one of up to 41 remote modems in the connecting system for transmission link and modem hardware testing.

Prices range from $1,140 to $1,270 per modem from 5520 Randolph Road, 20852.

Trendata Has Key Pad

SUNNYVALE, Calif. – Trendata has added a 10-key numeric key pad to its line of terminal equipment. The unit will fit on the firm's word processing devices and the 1900C terminal which operates on-line. Storage on both types of devices is on tape cassettes. The key pad costs $500 or $15/mo.

The firm also has dropped the minimum time limit on its rental contracts from one year to six months. The company is at 610 Palomar Ave., 94086.

Datachecker Adds Communications

SANTA CLARA, Calif. – National Semiconductor Corp. has developed a communications subsystem option for its Datachecker supermarket point-of-sale checkout system.

Datachecker's communications subsystem includes the input terminal and (optionally) the telecommunications modem, and can include various application programs.

All hardware and software are compatible with the binary synchronous conventions used by an IBM 270X or 370X, or by an integrated communications adapter or equivalent unit. Hardware cost for the communications subsystem (including modem) is $4,400 from 2900 Semiconductor Drive, 95051.

User Casebook

For Cost-Effective Upgrade

Non-IBM Software Enhances 3705

By Ronald A. Frank
Of the CW Staff

VAN NUYS, Calif. – Sometimes the addition of an IBM front end in combination with independent teleprocessing software can be the most cost-effective upgrade for a user. Such was the case at Proprietary Computer Systems (PCS).

The company operates two time-shared networks in start/stop transmission mode supporting APL and IBM's Administrative Terminal System (ATS). The net serves users in Chicago, San Francisco, Palo Alto, Calif., San Diego, Arizona and other areas.

The company has a 360/65 that was running with an IBM 2703 line controller. The 2703 was almost being used to its maximum configuration with 160 out of a possible 176 lines in operation. And customers were requesting support for 30 char./sec Ascii terminals but neither the APL nor ATS systems supported this type of device.

It was decided that the 2703 would be upgraded to a 3705. Software from Comm-Pro Associates would then be added to the 3705 emulator program to provide the required terminal support.

"We were aware of Comm-Pro and had them consulting with us prior to bringing in the 3705," said Larry Rice, manager of systems software at PCS. "We wanted a smart front end instead of just a replacement for the 2703 so we would not have gone to the 3705 without the Comm-Pro software," he said.

Before deciding on the 3705, PCS explored several other front-end systems. In several cases, the equipment seemed well suited but there was some hesitancy about the ability of the supplier to support the system, he explained.

The Comm-Pro software actually modifies certain branch routines in the 3705 emulator program, Rice said, which makes it possible to retain the standard emulator. In this way, if IBM issues fixes to the emulator, they can be easily incorporated. In addition, IBM maintenance is not affected since PCS keeps "the skeleton IBM emulator" available when it is required.

The non-IBM software modules include automatic speed detect features which allow the PCS network to handle either Ascii or IBM start/stop terminals. There is also a system select capability which allows a user to dial the same phone line to get on either the APL or the ATS system.

It is also possible for a user to switch from one system to the other without hanging up the phone and making a second connection. Since many of the users operate on both the APL and ATS systems interchangeably, the system select feature is a convenience, Rice said.

The Comm-Pro software actually makes Ascii terminals appear to have the characteristics of an IBM 2741 to the 360. The Ascii characters are translated into BCD code, Rice said. And the modules also make it possible for users with 30 char./sec terminals to utilize the same lines that normally support 10- and 15 char./sec devices.

Some extra translate tables were also installed on the APL system because Ascii terminals vendors are not consistent in the translate tables their equipment requires. So when a user signs on with the APL net, he can key in which translate table is required. The main differences are in the character sets, Rice said.

The terminals being utilized on the PCS net include TTYs, 30 char./sec Anderson-Jacobson teleprinters, Diablo terminals and others. The net uses dial-up lines with Bell modems, except at the central site where Vadic data sets are installed. The system includes an American Data Systems multiplexer in Chicago to combine some of the low-speed data streams, Rice explained.

Four Comm-Pro modules have been installed in the 3705 and they utilize only about 1K or 2K of memory, Rice estimated. The 3705 at PCS has 48K of storage but the modules will operate on a 3705 that has only 16K, he said.

The 360/65 has 2.5M bytes of core including 2M bytes of Ampex ECM storage. The system also includes 23 Ampex 2314-equivalent disks and eight IBM 3420 tape units.

The software cost PCS $8,000 including $3,500 for standard capabilities available for the 3705 and $4,500 to develop customized software, including APL support for a variety of terminals and the ability of the system to handle certain select characters.

Memorex Remote Batch Terminal Operates in Bisynchronous Mode

SANTA CLARA, Calif. – Memorex has introduced a bisynchronous remote batch keyboard terminal with a 200 card/min reader and impact printer capable of speeds up to 180 line/min for $470/mo. The device is said to have 70% of the throughput of the IBM 2780 for less than 50% of the 2780 monthly cost, according to Memorex.

The 1242-S Super-Sync printer terminal is appropriate for remote job entry and inquiry/response applications where data processing centers require better distribution and turnaround of their input/output data streams to areas where the information is being utilized, Memorex said.

The 1242-S includes IBM 2770, 2880 and 3780 line control compatibility, Ebcdic code, communication speeds to 9,600 bit/sec and dual buffer capacity up to 1K characters each.

Card Options

Memorex offers two punch card reader options. A 200 card/min model which leases for $105/mo, and a 400 card/min model which leases at $155/mo. An optical mark sense card capability can be added to either reader device for an additional monthly rental of $20.

Super-Sync, with a basic price of $275/mo, offers standard communication speeds up to 3,600 bit/sec. Ascii multipoint operation, dual 256-char. buffers, 30 char./sec printer and keyboard with editing capabilities.

A typical 1242-S configuration for a remote job entry station operating bisynchronously at 9,600 bit/sec, with a 180 line/min printer, a punch card reading capability of 400 card/min and a 512-char. buffer, leases for $580/mo.

Deliveries of the 1242-S will begin in June from San Tomas at Central Expressway.

Adds CRT Unit TTY-Compatible

HAUPPAUGE, N.Y. – A CRT display terminal has been introduced by Applied Digital Data Systems, Inc. (Adds).

Called the MRD-380, this TTY-compatible model displays 24 lines of data with 80 char./line and is a rack-mounted version of the Adds Consul 580.

An EIA RS 232C interface with switch-selectable transmission speeds of 110-, 300-, 1,200-, 2,400- and 9,600 bit/sec is standard on the 380. A current loop interface is also provided.

Operators of the new terminal can manually inhibit or enable upward scrolling of data across the screen. They can also control the flow of data to the printer interface which has been designed to drive any serial Ascii printer with an EIA interface. Cursor controls and various erase functions are also available.

The device displays black characters on a white background, which the company says reduces eye fatigue and provides highly legible characters.

The MRD-380 prices start at $1,195 from 100 Marcus Blvd., 11787.

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Data General introduces the first stereo computer system.

This computer not only looks like a music system. It works in stereo.

Two separate computers play off the same disc.

It's called the Dual Nova.

The Dual Nova is a standard off-the-shelf product. Which means it's fully supported by the operating system. You just plug it in and go to work.

Which is the first time you've been able to do that on a small dual processor system.

If you want to do load sharing, the disc gives you a huge storage area that both computers can use. So both computers can share the same datafiles and programs.

And if you want to use the Dual Nova as a redundant system, the backup computer won't just sit there. You can put it to work on computation, data reduction, or what have you.

And if one of the computers happens to go down, the other one will keep going. One can't hurt the other. Because they're totally separated. Electrically. Mechanically. And physically.

There's three discs to choose from: the quick access Novadisc, a cartridge disc, or big capacity disc pack.

You can use any two computers made by Data General.

And as it turns out, every Dual Nova computer has a foreground to do one thing. And a background to do something else.

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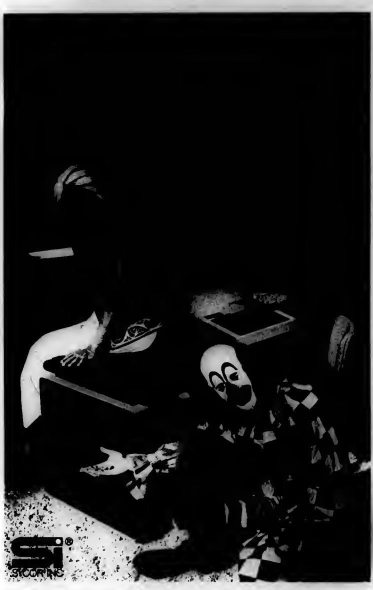

Our brand new Sycor-developed Hard Disk Drive.*

Its elephant-sized memory extends the capabilities of our Sycor 340 intelligent terminal into exciting new realms.

For one thing, you can now manage your own 2½ million character data base in remote branch offices. At an average access time of just 80 msec.** This new, larger memory reduces keyboard operations for better throughput and takes a load off the mind of your CPU.

And it's available for only $165 a month, including maintenance, on a two-year lease.

If your needs don't call for 2½ million characters of memory, our Sycor 340 with the fastest Flexible Disk Drive* on the market might be just the ticket. With 500,000 characters of memory and an average access time of 176 msec,** it's ideal for order entry applications involving small to medium size customer, salesman and product/price files.

Finally, there's our popular Sycor 340 with one or two cassettes (each containing 200,000 characters). It's still the lowest priced intelligent terminal.

Whatever your needs in distributed data processing, you'll find an intelligent Sycor 340 right for your company. Ask your Sycor representative about our Model 340 and its wide range of peripherals—like its three speeds of printers, a card reader and magnetic tape drives.

And don't forget to ask about the new Hard Disk Drive. The elephant-sized memory that works for peanuts.

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SYCOR

*Patents applied for **Includes latency time

Satellite Eases Global Calls

WASHINGTON, D.C. – Varian minicomputer is playing a key role in an advanced satellite-communications system that soon will carry direct-dialed telephone calls among more than 25 countries.

The system, created by the Communications Satellite Corp. (Comsat) for Intelsat, is called Spade (Single channel per carrier PCM multiple Access Demand assigned Equipment).

Spade transmits telephone signals through a combination of ground-based and satellite-borne equipment.

At every Spade ground terminal, the switching and coding of signals and the selection of radio channels are performed by a Varian 620/f.

49 Countries

Spade channels are assigned on demand: any available channel may be used to connect any pair of countries. One country can be connected to, say, 20 others by direct satellite link via a single Spade terminal, rather than by 20 separate cables.

Spade ultimately will be able to link 49 countries directly via satellite. At any instant, 400 two-way channels are available to Spade to carry calls, with a separate common signaling channel that groundstations use to tell each other when they want to transmit a call.

The system already serves about 15 countries; at least 10 more will join it by the end of the year; and still more will use it indirectly, by routing calls through a participating nation.

Each groundstation uses two 620/fs – one backing up the other. Thus the Spade system will employ about 100 such computers when it is fully developed. At the Comsat earth station in West Virginia, still another mini continuously monitors the common signaling channel, records the origin, destination and duration of calls passing through the system and computes the charge for each call.

Transmission of calls is entirely under the control of the groundstation computers. The computer in the country where the call originates, for example, decodes the dialing tones that initiate the call, and reformats the digits for radio transmission. It also selects a channel to carry the call, by consulting its record of the status (busy or idle) of the satellite's 400 channels. This record is updated continuously. A similar record shows the status (blocked or available) of each Spade groundstation.

Hazeltine Hikes Prices

LITTLE NECK, N.Y. – Hazeltine CRT prices will go up $10/mo on June 1, 1974. The increase will apply to "new shipments and rental renewals," according to the company's quarterly report to stockholders.

NCC'74
INSTANT REPLAY

If you couldn't make it to the National Computer Conference in Chicago, or if you went to the show but find that it's now all beginning to blur and run together, then we can help you.

We're Datapro Research Corporation, and our staff of professional EDP analysts attended the NCC '74 show and prepared a unique report on all important events and exhibits. Called "NCC '74 Eyewitness Report," the document captures all the flavor, excitement and color of the world's largest computer conference. It provides you with an overview of the show and its impact on the EDP Community. Plus individual reports on each exhibit provide you with the following: vendor's name, address and phone number, director of marketing, exhibit's physical specifications, products displayed and demonstrated (with special emphasis placed on new products and their delivery times), unique presentations, literature available and special offers.

EDP users will find NCC '74 Eyewitness report to be very helpful in keeping abreast of the hundreds of new product announcements made at the show, EDP vendors will appreciate knowing how their exhibit stacked up in relation to their competition, and everyone should find it valuable to learn of today's important trends in products and applications.

If you went to the show and things are beginning to get fuzzy, or if you were too busy to attend, Datapro can provide you with an "instant replay"—the NCC '74 Eyewitness Report. Over 200 pages, filled with photographs, handsomely bound, and only $29.

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SYSTEMS&PERIPHERALS

Bits & Pieces

$950 Disk Pack Cleaner Handles IBM-Type Packs

HILLSDALE, N.J. – A $950 disk pack cleaner from Texwipe Co. cleans IBM 3336-, 2316- and 1316-type disk packs. The System 652 turns the pack at 24 rpm and the operator holds Texwand and Texpad presaturated alcohol pads.

The on-off button allows the user to select either constant rotation for steady, smooth cleaning or to jog the pack into position for spot cleaning and inspection. Texwipe is at 52 Prospect Place, 07642.

And Now . . . a Punch Card Reader For a Hewlett-Packard Calculator

PALO ALTO, Calif. – Day by day those calculators look more like small systems – Hewlett-Packard has added a marked or punched card reader in standard 96-character Hollerith code for its Model 9870A calculator. Hand-feeding the 35-column card starts the motor which pulls the card through the reader when in the Interrupt Mode of operations. In the Data Demand Mode, the calculator starts the motor when data is required. The card reader is priced at $550, and power is supplied by the calculator. HP is at 1501 Page Mill Road, 94304.

IBM 1403 Interfaced to CDC 6400

SANTA MONICA, Calif. – Spur Products Corp. has a controller that enables the IBM 1403 printer to be operated by Control Data 6400 computers.

No computer programming changes are required to use the Spur controller, according to the firm.

The S1403/CDC-3 controller sells for $17,000 from the firm at 2928 Santa Monica Blvd. 90404.

FD-8200 Floppy Costs $3,850

SANTA ANA, Calif. – Standard Logic Systems, Inc. has added an FD-8200 floppy disk that includes 157K words of storage, double-redundant addressing verification, end-user front panel with indication for all operations and selectable drives for multiple drive systems. The FD-8200 has been interfaced with most minicomputers, and is priced at $3,850 from the firm at 3841 S. Main St., 92707.

Wang 2200 Gets Two Card Readers

TEWKSBURY, Mass. – Two 550-card capacity readers have been added to the Wang 2200 minicomputer system.

The 2234 photoelectrically reads 80-column punched cards at 250- to 300 card/min and is priced at $3,200. The 2244 reads mark sense cards at 300 card/min, in addition to reading 80-column cards, and is priced at $4,500.

The 2244 has an estimated three-month delivery. Wang is at 836 North St., 01876.

But Needs Careful Planning

Conversion to OCR Billing No Problem

By Bob Brown
Special to Computerworld

ATLANTA – In a billing/accounts-receivable operation, payments should be processed rapidly to keep each customer's account current, but it is crucial that payments be applied accurately.

Through the use of optical character recognition (OCR) hardware, and an applications program system which places heavy emphasis on error detection and correction, the City of Atlanta achieved both accurate and rapid transactions when it converted its water utility billing to OCR operation.

There are two possible approaches when converting any data processing system from punched-card input to some other medium, whether OCR, key-to-tape or on-line entry.

The simplest method is to produce 80-byte records for input to the "old" system. This approach has the advantage of being extremely easy (and therefore inexpensive) to implement.

The other approach is to completely redesign the "front end" of the system to take maximum advantage of the new technology. While initially more expensive, this approach can produce an efficient, easy-to-use, maintenance-free subsystem that may be expected to pay for itself in the long run. This was Atlanta's method.

The Old System

Atlanta Water System customer service representatives have for some years had status-of-accounts information on-line. Payments received by the municipal revenue collector during the day were keypunched on the second shift and applied to the master file for on-line access the next morning. All error corrections prior to the master file update were performed by DP employees, however, and there were certain types of errors they could not readily detect or correct. A small but significant number of this type of error in the master file had to be detected later by water system personnel.

There were often delays in processing certain "exceptional" payments, (such as when the customer did not submit a bill stub).

Most importantly, the municipal revenue collector's office, which accepts and processes all payments to the city, could not validate its bank deposit against actual transactions until the following morning, by which time the transactions had already been applied to the master file.

OCR techniques were applied as a cost-effective way of solving these problems and of coping with an increasing number of transactions. In order to provide effective solutions, OCR was viewed not merely as a keypunch replacement, but as an entirely new way of capturing and moving data.

IBM 3886 Model 2 equipment was chosen as it was felt that off-line OCR-to-tape operation would offer easier scheduling and would not burden the city's 370/145 with the relatively slow OCR device.

A basic bill form was designed for the 3886 to allow for the basic information of customer account number, water service amount and sewer service amount. Each field appears twice on the bill once in "clear" numeric format and once in alternate or "scrambled" format.

For example, a zero in a primary field appears as a four in the alternate field. And, finally a modulus 7 check digit was appended to every field. This redundance allows for extensive error correction under program control.

Only if the *same character* in both the primary and alternate fields is rejected is a reject-character passed to the next processing stage.

The use of an alternate character set for the second shift ensures that a damaged print-train slug or print hammer does not result in an unsupportable number of errors. Having two "different" numbers representing the same value, and each having a check digit also allows correction of single-digit errors which could not be corrected by the replacement process. Preliminary statistics indicate that although about 2% of the characters read by the 3886 are rejected, all but about .1% can be corrected under program control.

Special case payments are handled by a Numeric-HandPrint (NHP) field on each bill to be filled in if the amount paid is different from the amount billed. "No bill" situations are handled by an NHP duplicate bill form.

During the day, the municipal revenue collector's office assembles returned bills into batches, or "packs," and submits them to data processing. The resulting scanner tape is read by an application program which performs alternate-field and check-digit corrections and writes the corrected records into a direct access disk file. Teleprocessing transactions enable the revenue collectors to examine all the data in any pack, change any field,

(Continued on Page 42)

Conversion Insurance

Five elementa insured the success of the Atlanta OCR conversion effort:

- Sophisticated editing and error correction under program control, based on highly redundant data, to minimize the need for human intervention.
- A simple, effective method for manually correcting errors which remain.
- A very stable file structure capable of fast random access.
- System security monitoring to ensure control.
- Data integrity monitoring to detect and report on unreliable modification to the file, whether accidental or otherwise.

'Wired' Microfiche Used to Pick Regularly Used Card Images

By Vie Farmer
Of the CW Staff

DAYTON, Ohio – Users with applications that depend on input of repetitive procedure or item codes can automate this data entry task with the Procedure Selector System from The Standard Register Co.

The operator can select up to 5,400 items or services projected on a microfiche viewing screen – 120 items at a time – by attaching a magnetic probe directly to wires that criss-cross the front of the screen. Then the operator presses a button and an 80-column card is punched with the item number.

In a typical application, for example, a nurse would adjust the microfiche viewer to display a page with names of medical items, services and procedures.

She would also place an embossed and coded card into the machine. The nurse would then select an item to be entered, attach the magnetic probe and hit the punch button. The card punch will then punch the information on the card, in this case the patient's name, as well as a code number for the service performed or item. If more than one item or procedure is required on the same card, up to 10 separate entries can be made.

The description of each item for the viewing screen can take up to three lines of 14 characters. Microfiche pages can be made up to individual requirements and can be changed at any time, according to the firm.

Each item is assigned a six-digit code number. The system presently uses the firm's Zipcard forms which combine a punch card with paper copies. The firm also is developing interfaces to its LCT series of terminals which would convert the output to Ascii. The Procedure Selector leases for $125/mo, the source record punch for $70/mo, and an LCT communications terminal from the firm leases for about $270/mo. The company is at 626 Albany St., 45401.

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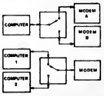

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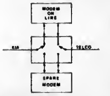

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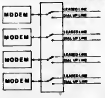

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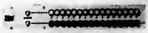

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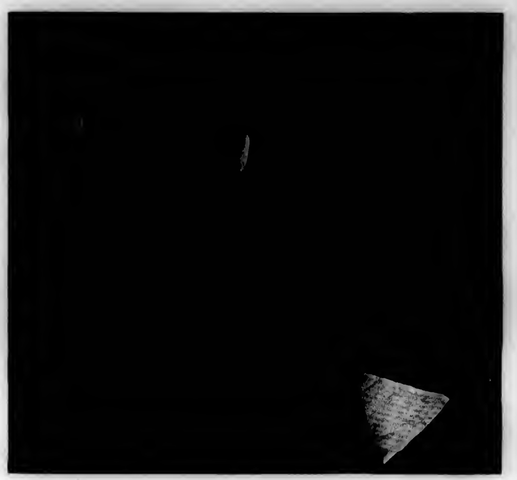
President of Datapoint Corporation



Today the typical company spends more to collect and move business data than to process it. Probably you already know how to select an equipment vendor for your computer room. But how about the equally important selection of a vendor for equipment to collect and "massage" data at your field office locations and move it to and from your central computer—what we call Dispersed Data Processing.

The most critical consideration in selecting a vendor for Dispersed Data Processing equipment is the ability to support ALL your present field data collection and communication requirements, and as your business grows, to support your EXPANDED needs swiftly and economically. Much of the dispersed processing equipment currently available is impractical to upgrade without a major new investment in equipment, software and training. The wrong choice here could cost you more than your original investment, since replacing equipment at multiple field locations is more complex even than replacing a central computer.

With Datapoint equipment, the problem is avoided. We offer three upward compatible dispersed processors, the 1100, 2200 and 5500, which provide progressively increased power and work productivity. Their upward compatability makes system upgrades a simple, painless transition, without the wastefulness of multiple Dispersed Data Processing vendors. No other vendor now offers such a trio of compatible processors. No other dispersed processing equipment offers as many operating advantages.

What else should you look for in a data communications vendor? Since this is a dynamic new area of the technology, you will likely be dealing with one of a dozen young, innovative companies. STABILITY, therefore, is a key consideration. It is indicated by a vendor's growth as well as by number of installations, financial resources, and reference customers. Datapoint is maintaining an annual growth rate in excess of 60% in an industry expected to reach a $1 billion annual shipment level by 1980. With over 4,000 2200 systems installed in some of the largest and most prestigious companies in the world, Datapoint is a clear leader in the Dispersed Data Processing industry.

You should also look for vendor COMMITMENT. Indicators of commitment to the Dispersed Data Processing Business are willingness to lease, percentage of total revenue derived from Dispersed Data Processing, availability of operating software, vendor supplied field maintenance support, and the level of on-going product development activity. In all these categories, Datapoint ranks at the top.

Since 40% of all units shipped by Datapoint are on lease, Datapoint has a major interest in development programs which extend the useful life of existing products by maintaining their competitive advantages. Similarly, Datapoint assumes contractual liability for the maintenance of its own equipment in over 700 cities from 34 strategically located customer service centers, further illustrating commitment to product reliability.

These are a few of the reasons why the leader in Dispersed Data Processing is DATAPOINT. We'd welcome the opportunity to discuss your company's data communications and dispersed data processing needs personally. For information on the company and our dispersed processors, write or call the sales office nearest you or contact Datapoint Corporation, San Antonio, Texas 78284.

H E O Kelley

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OCR Conversion No Real Problem

(Continued from Page 40)

manipulate control totals and scan the file for out-of-balance or error conditions. All data is corrected and is balanced by the end of the working day it was received. The records are sorted by account number and applied to the master file on the second shift.

Data in the disk file is kept secure from unauthorized or erroneous modification (whether malicious or accidental) by data integrity monitor and system security monitor routines built into the applications programs. Statistics on scanner performance are also collected for system maintenance and quality control.

The system security monitor provides password protection under control of the user for certain control functions and monitors all attempts to update the file. Illegal or unsuccessful attempts to update the file generate a "System Security Check" message at the computer operator's console. In addition, the monitoring information is stored in the control block of the file. This table identifies the terminal, threat type and count.

It is printed out by each batch program and is cleared daily. The system security monitor also observes and logs all changes to the security status of the system, e.g., changes to the terminal authorization list, a key computed from the password, etc. The password itself is never stored; rather, a key computed from the password using a "center of square" algorithm is stored in the control block. Although the encoding of the password requires only two machine instructions, the inverse of the algorithm is obscure and does not lend itself to analytical solution.

The second line of defense is the data integrity monitor, which attempts to ensure the reliability of the file through a series of programmer checks. A distinction must be made between *reliability* and *correctness;* the data integrity monitor requires that all updates be made through an "authorized" program path and they be correctly and completely applied, but it cannot protect against valid but incorrect data.

A series of crossfoot checks between the control block and data blocks is used to detect incomplete or incorrect updating due to program failures. Update auditability is provided by a "program signature" routine which writes the program ID, data, time, load address and a checksum at the end of each physical block each time it is updated.

Bob Brown is the chief of information systems, Medical Association of Georgia. He was formerly with the City of Atlanta.

New Compact 3M Cartridge Drive Takes the Crunch Out of Auxiliary Storage Costs

Now small size, low cost and high performance extras give you the edge in digital recording for communications terminals, minicomputers, point-of-sale systems, data gathering, and other applications which demand fastidious performance in minimum space.

The Qantex Model 600 uses the ¼", 4-track 3M data cartridge. Data is written at 1600 bpi, with 30 ips and 90 ips speeds. Data transfer rate: 48,000 bps. Complies with proposed ANSI standards.

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DPMA to Focus on Management Growth

MINNEAPOLIS – Twenty management growth topics ranging from data security and project control to communications and data entry systems are scheduled for this year's Info/Expo, sponsored by the Data Processing Management Association.

"Stay on Top of Tomorrow" will include ideas exchange conferences on microforms, point-of-sale systems, minicomputers, small- and medium-scale systems and virtual memory.

Personnel management, budgeting, communicating and career path development and management are among the topics to be covered in personal growth sessions.

Societies/ User Groups

A special management presentation on the IBM data security studies will be held on the last day of the conference.

How to manage data communications, education for employability, the effective use of programmable calculators, and mixed shops are subjects scheduled for examination in special exchange sessions.

In addition to the educational program, a wide variety of exhibits will be open during the conference June 23-26 at the Minneapolis Convention Center.

Registration for the conference is $150 for DPMA members, $190 for nonmembers.

For further information contact John A. Guerrieri, DPMA International Headquarters, 505 Busse Highway, Park Ridge, Ill. 60068.

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Purdue Course Teaches Remote Data Analysis

WEST LAFAYETTE, Ind. – Purdue University is sponsoring a short course for those who wish to learn how to analyze remotely sensed data such as that from the ERTS and Skylab satellites.

The nucleus of the course is a series of workshops on the analysis of multispectral data using the Lars software system as a prototype of a digital remote sensing processing system.

The course will also include discussions on radiation theory and energy-matter interactions, the physical basis of remote sensing technology.

Registration is $475. For further details contact John Lindenlaub, Purdue University, Laboratory for Applications of Remote Sensing, 1220 Potter Drive, 47906.

Calendar

May 16-18, Johnstown, Pa. – Third Asis Mid-Year Meeting: "On-Line Systems and Standardization." Contact: Mary C. Berger, Ferro Corp. Library, 7500 E. Pleasant Valley Road, Independence, Ohio 44131.

May 18, Arlington, Va. – Intelligent Terminals Seminar, sponsored by the Old Dominion Chapter of the Association of Computer Programmers and Analysts. Contact: Harvey Weiss, 1820 N. Quantico St., 22205.

May 19-22, San Francisco – 1974 National Operations and Automation Conference, sponsored by the American Bankers Association. Contact: Sharon Jackson, Convention/Meetings Services, ABA, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

May 20-22, Boston – American Society for Quality Control 28th Annual Technical Conference. Contact: ASQC, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203.

May 20-22, Los Angeles – Security Seminar. Contact: Jerry Schneider & Co., 1888 Century Park E., 90067.

May 21-24, New Orleans – American Institute of Industrial Engineers 25th Annual Conference and Convention, "Unmasking the IE Role." Contact: Jim Wolbrink, AIIE, 25 Technology Park/Atlanta, Norcross, Ga. 30071.

May 23, Gaithersburg, Md. – Computer Networks – Trends and Applications, sponsored by the IEEE/CS and the National Bureau of Standards. Contact: Harry Hayman, P.O. Box 639, Silver Spring, Md. 20901.

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'LEASING SPECIALISTS'

All Tutorial Program

Students Train on Simulated Patients

The World of Medicine

By Nancy French
Of the CW Staff

HAMILTON, Ont. – A computer system here is being used to supplant the traditional lecture courses and formal classes found in most medical schools.

McMaster University has built a three-year program of medical training that is entirely tutorial – with no lecture courses or formal classes – around the Hewlett-Packard 3000.

Demonstrates All

The computer system can be used to demonstrate almost everything from the effects of drugs and other treatments on simulated patients to the diagnosis of certain types of tumors.

It also records research data transmitted directly from laboratory instruments and performs statistical analyses of public health information.

In teaching medical students how a patient will respond to scientific physiological changes, the university uses mathematical models which are run on the HP 3000.

Each model describes a specific relationship between two or more physiological factors.

For example, an equation can show how blood pressure will change when the patient's heart beats faster. By combining such equations, a model can depict – in mathematical form – how a patient's cardiovascular system, for example, will respond to a wide variety of internal and external influences.

The cardiovascular model used at McMaster gives the student data on an imaginary patient including information such as heart rate, blood pressure, blood volume, etc. By altering one or more of these factors, as he might do with a human patient by means of physical or chemical treatment, the student can observe immediately the physiological consequences of the change made.

Similar models depict lung and kidney physiology.

Tumors Diagnosed

A program for statistical diagnosis of bone tumors is used both for teaching and for confirming diagnoses made on actual patients. From a description of the patient's symptoms – derived from X-rays of the affected bones – the program determines what type of bone tumor probably is present.

It computes the probability that its diagnosis is correct, and also gives alternative diagnoses and their corresponding probabilities.

The HP 3000 is used extensively in statistical analysis, both for research and teaching purposes.

Analyzes Variables

For example, the Division of Health Sciences has data on about 350 local children, showing their physical characteristics and medical condition at birth, and at six-month intervals thereafter for 12 years. Using a statistical program originated at the University of Washington, a student or a researcher can analyze hundreds of combinations of variables such as order-of-birth vs. height at a specified age or birth weight vs. maternal age.

Dr. Gary Anderson, assistant professor of biostatistics at McMaster University, oversees medical student training via interactive terminals.

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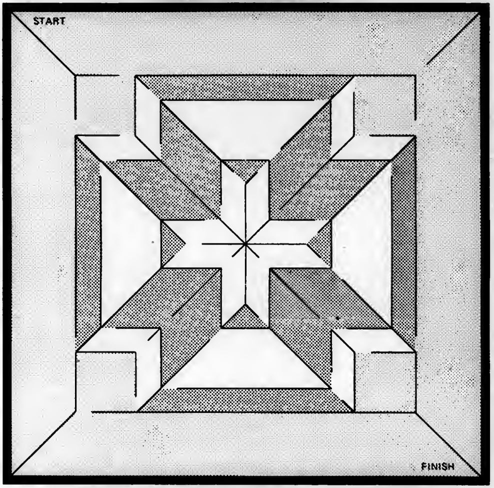

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Separate Skill Areas

Organization Key to Factory Monitoring

By Patrick Ward
Of the CW Staff

CHICAGO—Computerized factory monitoring systems are growing more popular as manufacturing plants become more complex, but basic organizational problems can easily defeat the purpose of these systems, S.J. Hyduk, senior staff project engineer at General Motors, told an NCC session on Equipment Monitoring and Information Use.

While systems houses and mainframe vendors can install technically successful monitoring systems, it is up to the user to organize the equipment's use—and the overall success of the monitoring system is likely to hinge on this aspect, Hyduk told the audience..

He stressed the monitoring system must serve a specified organization responsible for defining and using the information it produces. Otherwise, no one may take the required action, or the wrong person may make a shortsighted decision.

At the GM installation, the monitoring system's goal is to supply information to the maintenance department on machine breakdowns so repairmen can keep the equipment up as much as possible.

The system consists of 34 data collection centers which tie into the 5,000 points on 400 monitored or controlled machines.

Computers in Manufacturing

Two twisted pair shielded wires run from each data collection center to a Xerox Sigma 3 CPU with 40K words of memory.

Divide and Conquer

The organizational approach is to divide the large plant into skilled trade zones with a multiskilled foreman in charge of the repair tradesmen in each zone. The foreman and his tradesmen communicate with one- and two-way radios.

When the monitoring system spots a problem, a light flashes at a control console and an alarm message appears on a CRT screen. The dispatcher at the console can use a CRT to investigate the problem in more detail.

The screens also indicate the location of tradesmen available to answer a call.

Other screens indicate needed repair work, with high-priority jobs automatically rising to the top of the screens. The dispatcher or the foreman assigns a tradesman to the job without any paperwork involved. This usually takes less than a minute and a half, Hyduk stated.

GM chose a combination light and CRT screen alerting system, Hyduk noted, so dispatchers can evaluate overall plant functioning at a glance and then turn to a specific problem on the screen. There is also audio warning at different levels to announce trouble.

Hyduk said GM economically justified the system before installing it. Return on the expense is more than adequate, he said, equally due to reduced production downtime and utilities conservation.

The cost of the system is primarily in its wiring, Hyduk noted. A replacement CPU for his system would probably lease at $30,000/year, but that would be only about a tenth of the system's cost, he observed.

Together the CPU and data collection centers take up only 40% of the total, with wiring accounting for the remainder.

The decision on what to monitor is based on the likelihood of problems for either personnel or production, Hyduk said.

On-Line Approach Smooths Flow in Critical Stages

CHICAGO—Factory line production managers face mountains of paperwork in controlling the manufacturing prices, but the documents they deal with seldom maximize their efforts.

An on-line terminal approach using CRTs and small data-entry terminals at critical stages in the production cycle can both reduce the paper work and give managers access to current information, two IBM senior manufacturing representatives told an NCC session entitled "C-Comp—Communications Oriented Manufacturing Plan: A Paper-less Factory Approach."

Such manufacturing systems can be cost-effective because they offer greater control, accuracy and reduced clerical work, Dennis Sears and Theodore A. Bakalar claimed. Both urged, however, that such systems be installed in modular pieces, thus simplifying control at the start.

Significant among typical management responsibilities is order staging—determining the availability of sufficient components for production by a particular date.

Knowledge of a given order's point in the production cycle is also important, and the manager must know an item's planned usage level for control of incoming productive material. Thus he must be able to determine current, and more importantly, future workloads.

Replacing manual control systems with computer terminals on the shop floor is one way to beat the paperwork problem, Sears said. He stressed that installing CRTs "is not the leading edge of technology" and stated that "manufacturing has been behind in this kind of technology" until the last few years.

Although CRTs can solve the paper problem, they don't necessarily provide managers with timely data. They can simply be "a much more expensive way of looking at a stop-action picture" of the manufacturing process, providing little more usable information than manual methods or reports from batch processing of factory data.

Sears and Bakalar described a hypothetical firm's terminal-based system using both CRTs and lower-cost, shop-floor data entry terminals that provide steady input to a data base as materials and jobs move through the factory.

When incoming material arrives at the receiving department, an operator checks the shipment's packing list against the factory's purchase order on a CRT screen. The purchase order number is on the packing list from the vendor.

The operator enters the quantity received in the shipment and the ID tags needed for the material.

The system posts the quantity received to the purchased item record on disk and a hard-copy printer at the receiving dock prints out identification and receiving labels with the routing of the material on the latter.

The operator attaches the newly printed labels to the material ID tags and attaches another to the receiving ticket—a card with an identifying number punched onto one end.

An inspector then checks the material, using a CRT screen to determine requirements. He enters his results by inserting the receiving ticket into the small data entry device.

The system then updates the purchased item status file and notes the material is available if needed at this early stage.

The inspector returns the ticket to the ID tag pocket and moves it along to the required stockroom. A materials handler records the move and takes the material to its assigned place. A stockroom attendant adds the exact location information to the ticket. At this point, the material usually loses is unique shipment number and assumes that of its material type.

As the cycle continues, the production control analyst reviews material supply on his CRT and can make the go or no-go decision without risk of later obstructing the entire production stream.

The system updates the shop's order and operations files as work on the order begins. It generates requisition orders and the stockroom material handler locates the material and reports any exceptions. The handler moves stock to the department listed, noting it on the current ticket.

The system also creates a labor ticket, and the machine operators report their activities through the terminal. The cycle continues through the final shipping stage to the customer.

ACM Outgrowing Past Reticence On Making Public Policy Stands

By Edie Holmes
Of the CW Staff

CHICAGO—The Association for Computing Machinery (ACM) seems to be outgrowing its Cassandra stance on issues involving computers and public policy.

At a meeting of the committee on computers and public policy, ACM members agreed that their organization could no longer simply warn people without taking an active stand on problems of public concern. The specific question before the committee was whether to come out with a policy statement on the half a dozen right-to-privacy bills now before Congress.

Posing the question for the committee, Chairman Daniel D. McCracken asked its members to determine "what, if anything, we as computer people have to say about this legislation."

The group immediately concluded that, at the very least, computer experts should have the right to voice opinions in technical areas. Whether technical experts have a responsibility to comment on the potential social consequences of computer use provided material for more extensive debate.

ACM's legal issues committee has already received a request from Rep. Barry Goldwater Jr.'s (R-Calif.) office asking for assistance on two technical questions relating to his privacy bill.

Both the legal issues committee and the computers and public policy group are willing to attempt answers to questions of overaccess by users and technical and cost effects of extensive software revisions to meet privacy legislation standards. But neither feels free to submit its opinions in the form of an ACM policy statement.

All recognized the need for a stronger posture than the conventional disclaimer, however. The computers and public policy committee finally agreed to send a letter to Goldwater's office, commenting on the questions posed by the congressman and expressing a willingness to provide a list of people committee members feel would be qualified to speak before congressional committees on the privacy issue.

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Between Management and DP

Lack of Communication Creating 'Credibility Chasm'

By a CW Staff Writer

CHICAGO—Data Processing has become such a significant portion of the expenses in retailing, with some stores allocating from 1% to 2% of their gross sales to DP costs, that DP management is essential to an effective overall operation.

But problems exist which have caused a credibility "chasm" between management and DP, according to a panel session here last week.

What is needed, Joseph A. Lev of Cresap, McCormick and Paget, Inc. told NCC attendees, is an effective DP management process, and this can only be installed with wholehearted top management support.

The two main problems, he said, arise from lack of communication and poor systems development processes.

These problems account for great waste and excessive unnecessary cost in DP, Lev stated, and are essentially due to management shortcomings.

"This results in poor utilization of equipment, redundant programming during systems development, poor communications between the user and management and systems development rework," he said.

Root Deficiencies

Lev commented on seven key root deficiencies which, he said, can be found in the way DP is handled in many stores.

The first problem is that management is not appropriately involved at the critical stages of systems development, he said, "where they can and should make meaningful input and provide the needed direction."

In addition, basic alternatives are not thoroughly evaluated. Users tend to erroneously assume that a DP approach is the only alternative to the present manner of processing their information, Lev said. "The whole question of whether the basic process is appropriate is rarely considered."

Others problems Lev mentioned include poorly defined and understood roles and responsibilities of users and DPers, inadequate attention to the allocation of resources in line with the store's overall goals and objectives, a poorly planned and executed installation, improperly emphasized operation (from the user's point of view) and insufficient long-range planning.

Specific Solutions

Mark A. Trozzi, also of Cresap, McCormick and Paget, said there are specific elements of the DP process which are necessary to ensure proper and effective management.

Computers and Retailing

The first of these is a mechanism for appropriate top management involvement, which, he said, can be accomplished via the existing committee structure of the organization.

This top level DP policy committee, which will serve as a bridge between the goals of the store and the future path of DP, should review and recommend approval of long-range plans, recommend priorities on major projects, determine major allocations of DP resources and review any major expenditures of DP, including the annual budget, Trozzi said.

DP and systems projects must be brought together and coordinated at a single point, he emphasized, and users must be involved in systems development.

"The next element of the DP management process is a well-documented and well-understood method of developing systems," Trozzi commented, adding that this should consist of eight phases: initiation, design in concept, design in principle, design in detail, programming and testing, implementation, post-implementation audit, and maintenance and operation.

The final necessary element, he said, "is a long-range plan to guide the use of DP within the store, and a continual planning process to assure that the long-range plan remains as a document which is a realistic picture of the future."

Retailers Put In a Word or Two About Their System Desires

By a CW Staff Writer

CHICAGO—Retailers heard some hard facts at an NCC session at which they finally got a chance to state what they want from point-of-sale (POS) systems.

"Up until now, most retailers have had independent, non-DP people involved in equipment evaluation and selection," said John King, industry specialist for the Esis division of Bunker-Ramo.

Only 50% of data processing departments have assisted management with meaningful contributions in this area, he asserted.

POS objectives include increased profitability at the store level, flexibility for future growth and minimum change in the overall store operation, he said, noting that manufacturers cannot assume sole responsibility for such a spectrum.

The first step, he said, is an action phase during which objectives and strategy should be outlined and management informed of the costs and benefits it can expect.

Documentation should come next, during a test phase, King said, and at the same time, responsibilities should be assigned.

This is followed by a phase of feedback from corporate, store and customer sources, he continued. "It may only be that your sales people think the height of the bag stand should be adjusted or a key on the terminal moved, but listen," he urged.

Take a Rerun

During the subsequent implementation phase, the original goals and objectives for the system should be evaluated, he said. "Analyze the situation once again, and you may find that some original key ideas have little or no value now that the test has been run," King said.

Ralph Converse, IBM marketing representative for the distribution industry, also stressed the importance of user/manufacturer interaction.

"It's important for us to understand your current operations and how you plan to change these so we can implement hardware and software and have it available when you need it," he said.

Equipment manufacturers need support from retailers in such areas of consumer education as price marking, Converse concluded, placing ultimate responsibility with the retailer.

Vendors 'Breathless' in POS Race

CHICAGO—What would manufacturers like to see happening in point-of sale? A slow-down in the pace of changes and industry standardization, according to Michael Coleman.

But in the meantime, they will continue to try to aid the retailer in key areas, said Coleman, director of retailing programs for Sweda International.

The needs of the retailer have grown significantly in the past few years, he said, citing an increase in accounting functions, proliferation of merchandise and substatistics as a few of the important areas. For instance, he said, in 1950 there were 75 variations of bedsheets, in 1960 there were 350 and today there are some 2,500 variations.

In the area of merchandising, POS has contributed greater data accuracy and greater levels of information, due largely to encoding, Coleman said.

"This," he stated, "allows the retailer to respond quickly to sales trends and avoids costly mark-downs."

More accurate register balancing has reduced, and in some cases eliminated, the old "short" situations, leading to improved cash control and accounting, he said.

POS has also helped in overall store operation by simplifying the procedures for transactions, leading the salesperson through the process. "Eliminating operation decisions not only speeds the sales process but also prevents bad data from entering the system," he said.

"However, if you take a good close look at POS installations, most are merely electronifications of current cash register functions," he said, adding, "We still have a long way to go."

Non-Food Items in Supermarkets Degrade Profits Realized by UPC

CHICAGO—While the growth of one-stop stores and supermarkets has simplified the purchase of food and non-food items for shoppers, it is causing a problem for supermarkets that use the Universal Product Code (UPC), because the non-food industries have a different standard.

The focal point of many food industry Point-Of-Sale (POS) systems is the scanner which reads the UPC, Earl Brown, NCR manager for retail accounts, said at an NCC session.

As the number of source-marked items increases, so will the use of scanners to realize some of the profits retailers have been seeking, he said.

But more and more supermarkets are having to handle a mix of food and general merchandise items, mainly because nonfood items have a better profit margin, Brown stated. But the different product codes can have a negative effect on profits in a scanner environment, he added.

No one device on the market has the ability to read both UPC and OCR codes, he said.

Consequently, he said, the food industry is faced with exactly what it had been trying to avoid—the degradation of the efficiency of the checkout stand and hence the levels productivity and customer service.

"We could have two checkout stands, but that wouldn't be practical," Brown said. "We can develop one terminal device with two readers, but as manufacturers we would rather not.

"What I would like to see is a standard code for retailing in all areas," he said.

Three Choices Available

Food Scanner Technology Varied

CHICAGO—Scanner design is not going to be the deciding factor in point-of-sale (POS) profitability for a store; retailers, through their method of operation, will determine the savings, NCC attendees were told at a retailing session.

Fred Bialek, vice-president and general manager of the systems division for National Semiconductor Corp., described the three types of scanners available to the food industry: cross scanners and two window scanners—vertical-horizontal or sine wave.

The cross scanner, used by Univac and National Semiconductor, consists of two slots at 90-degree angles to each other, he said.

NCR, Esis, Sweda and National Semiconductor offer a vertical-horizontal window scanner, while IBM and Scope (an OEM) offer sine wave window scanners, also known as Lissajous pattern scanners.

"The ultimate trade-off is cost versus performance," Bialek said. "Scanners will save money at the store level, but other savings from POS, such as effective use of information, will be greater. And store managers are the ones who will decide how great."

The cross scanner is the least expensive because cost comes down to a question of simplicity, he said. "In any raster pattern, such as the other two scanners use, more logic is required in order to eliminate redundant readings."

In terms of reliability, he said, National Semiconductor feels the cross scanner is the most reliable because it is the simplest.

Performance depends on the depth of read, he stated, which hinges on spot and symbol size. While symbol size can vary from a height of 0.7 in. to 1.5 in. and a width of 1 in. to 2.25 in., spot size can vary from .005 in. to .010 in. on up, he said.

Improvements Must Affect Owner's 'Bottom Line'

CHICAGO—Improvements in point-of-sale systems cannot come about because their manufacturers think it would be nice, Joseph Vale, vice-president of marketing for the midwest region, Regitel, told NCC attendees at a retailing session.

"We need the technological advancements and the systems developments in order to effect the changes we would like to see," he said. "But most important," he stressed, "no matter how good our system is, it has to affect the retailer's bottom line.".

Three areas of store improvements which will lead to better costs are the selling operation, the in-store operation and the total store operation, he said.

"If your sales personnel are not burdened with putting information into a system, they can do their real job—selling," he said. In terms of in-store operation, POS gives the manufacturer the information he needs when he needs it, through flash totals, for example.

"POS can also give the retailer many things which before were hybrid systems, such as payment transactions, a bridal registry system, a purchase order management system or an automated mark-down system," he noted, citing minis as the reason such systems are now available.

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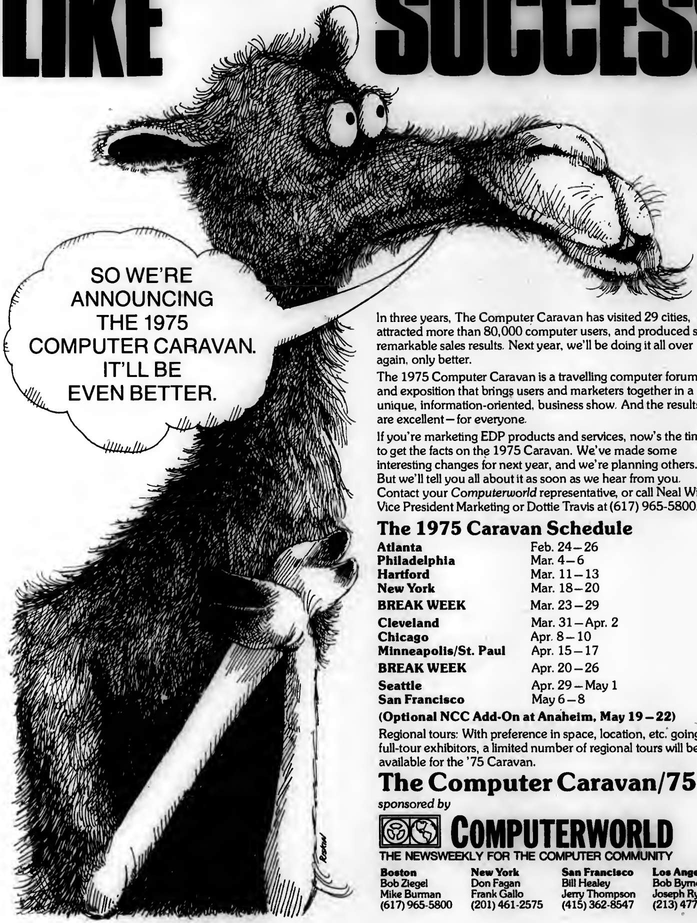
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BREAK WEEK	Mar. 23 – 29
Cleveland	Mar. 31 – Apr. 2
Chicago	Apr. 8 – 10
Minneapolis/St. Paul	Apr. 15 – 17
BREAK WEEK	Apr. 20 – 26
Seattle	Apr. 29 – May 1
San Francisco	May 6 – 8

(Optional NCC Add-On at Anaheim, May 19 – 22)

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Retailing Session Told

Proof's in the Pudding—Sales Transaction—for POS

By Toni Wiseman
Of the CW Staff

CHICAGO—The proof of benefits from point-of-sale (POS) is beginning to be realized, but each segment of the retailing industry, from mass merchandising to grocery operations, looks for these in different areas.

The retail business starts and ends on the sales floor, Hans Rubner, manager of merchandise systems for Montgomery Ward, told an NCC audience.

From the customer's point of view, the sales transaction is the most unpleasant part of retailing, since this is where the money leaves, be said. It is also the most unpleasant part for the store controller because of inaccurate input. In addition, merchandise information, credit approval and inventory input all take place at the point of sale.

The sales transaction is also the area where POS will impact the retailing industry, he stated, both economically and structurally.

Training time, for instance, can be cut in half with electronic cash registers he said, with retailers staffing toward peak times.

In terms of speeding up transactions, by automatically calculating tax and change, gathering information from a scanner and performing table lookups for correct fields, the terminal itself can save 20% to 25% of the transaction time over conventional registers, Rubner said.

And with a wand, he added, the transaction time can be two to three times as fast as with a conventional register.

In addition, the terminal's ability to transmit information to and from files permits "zero floor limits" (credit authorization check for every purchase, no matter how small), thereby saving many direct dollars and substantially reducing risk in credit extension, he said.

"Credit authorization, transaction time and training can all be translated into direct dollar savings at the point of sale," Rubner stated.

Behind the Scenes

In the back office, accounting functions and sales audits are simplified, and POS systems all but eliminate the need for data preparation, he said.

"Timeliness is POS' most outstanding feature," he said, "resulting in reduced cash flow and more meaningful information in terms of transaction pattern analysis, sales analysis, flash reports, etc."

Finally, relating to back office savings, a POS system can cost-justify a network of CRTs and other peripherals for future expansion of management capabilities, Rubner said.

The timeliness and accuracy of information are both factors in the economic justification of POS, he said.

"Whereas today we consider a 75% sales report within a week pretty good, with an accuracy range of 85% and no idea of what we missed," Rubner said, "with POS we can expect a level of 95% reporting within three days and complete knowledge of which items were incorrect or missed."

Food Merchants

In the supermarket area, the benefits and savings to be derived by POS are qualifiable, but not quantifiable, Harry Schreiber of Peat, Marwick, Mitchell and Co. said.

For instance, the potential savings in front-end operations should be considerable, he said, but no functions will be eliminated, there will still be people receiving and doing checkout.

In addition to the hard and "soft" savings which POS advocates predict, there will be noise savings, Schreiber said. "The sooner it is possible to get your information into common language form, the less opportunity there is for it to be misread, misunderstood, miscopied or lost. You're going to eliminate the "chasing function," he said.

Shrink—a depreciation in cash or value of inventory—can account for .6% to 3% of sales, Schreiber said. Part of this is due to theft, which POS cannot help, but more of the shrink problem is attributable to wrong pricing.

In the supermarket area, he said, there are under-rings, misses of items going down the conveyor belt, stamps given for the wrong items, goods mispriced and invalid coupons.

"All of these would be fairly effectively controlled by the over-the-end and bagging operation most manufacturers are showing," he said, "and the shrink problem would be reduced and these costs recovered."

Chicago Chuckles

Women's lib was in evidence at NCC last week as convention goers noted there seemed to be many more women in attendance than ever before. To Male Chauvinist Pigs it was a welcome diversion from dull technical discussions and hardware displays.

McCormick Place, while beautiful, was also extremely large, which meant long walks for many attendees between sessions. However, most agreed that it was better than having technical sessions spread between widely different facilities as was the case last year in New York City. It was especially welcome on Wednesday in the record cold and rain.

Although Afips printed over 90,000 exhibitor guest passes for exhibitors to send to contacts in the Chicago area, the results were disappointing with one of the lowest exhibits-only registrations in years.

Most people would not consider the proceedings of an NCC high on their list of best reading, but here last week there was a run on the books. During the first day so many attendees picked up their copies that the conference managers ran out. They will be mailed later to interested attendees.

Computerworld staff members almost got a late start at NCC last week as they were distracted by an electronic tennis game on display.

Pat Ward, staff writer, won the doubles tournament—the singles winner is still being debated.

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FAST BECOMING THE STANDARD

Johnson Systems, inc.

Firm 'Can Deliver' With On-Line Order Entry System

By Patrick Ward
Of the CW Staff

CHICAGO—Installing an on-line terminal order entry and manufacturing control system helped Allen Bradley Co. sharply increase sales even as its labor force remained steady, Jerome Rickert, system project manager, told an NCC session entitled "On-line Systems, Vision or Reality."

The reason for the sales climb, Rickert said, is that "we can deliver," and he credits the firm's on-line system with helping to provide a competitive edge.

The manufacturer of production control equipment and diverse other products converted from basically manual procedures to an on-line system over three years ago.

The system, which cost about $2 million to implement, now includes 115 IBM 3270 CRTs and 50 IBM 2790 CRTs controlled by an IBM System/7. Transactions, defined as a device making contact with the data base, number about 81,000 over a 12-hour period.

The company devised its own in-house data base and communications monitor for the system, both for efficiency and because there was not much else available at the time, Rickert explained.

The advantages of a data base, Rickert stated, include elimination of duplicate files, reduced maintenance time and cost and increased accuracy and validity of data. The data base approach also allows an open-ended system, maintained by operational personnel, not programmers.

And the most rewarding part about an on-line system, Rickert commented, is that the user enters his own data, so if something goes wrong "he has only himself to blame."

Allen-Bradley's conversion to on-line factory information handling simply brought together existing manual files, Rickert said.

One current application has the company's 12 coast-to-coast distributors entering orders via CRTS into the main CPU at company headquarters in Milwaukee. This reduces paperwork and cuts the need for extensive inventory at the distributors' sites.

Other applications include materials control and planning and dynamic shop floor control which involves labor accounting.

Rickert said the company's DP department is organized into functional project groups. These groups try to bring in a full-time user liaison whom they train in DP and who then works with them on applications.

"We didn't have anyone familiar with on-line" technology when the company started working on its system, Rickert recalled. The first year the company spent $50,000 on education alone, developing in-house expertise.

Switch to IMS Jolts Budget

CHICAGO—Allen Bradley Co. tries to keep its DP budget within 1% of the company's sales, but this year software considerations may make that budget ratio a bit unstable.

The firm's earlier move from OS/MVT to VS brought about a 20% throughput gain, said project manager Jerome Rickert. Putting in Hasp produced a further 10% gain. But now the company is converting to IMS and is running into some overhead, he said.

Allen Bradley is a BAL shop, doing about 80% of its work in that language and the rest in Cobol. BAL provides greater processing efficiency and interfaces more easily with the home-grown communications monitor, Rickert noted.

Law Enforcers Defend Need for Maintaining 'Historical' Records

By Nancy French
Of the CW Staff

CHICAGO—Disputing the civil libertarians' principle that arrest records not resulting in conviction should be periodically purged, a law enforcement administrator said last week, "a valid record established should stand." Implicit in that judgment, he said, is "accurate and timely disposition of every case."

Administrator of law enforcement for Wisconsin's Department of Justice, Howard Bjorklund said he opposed periodic "purging of records because it's better to maintain accurate historical records than try to reconstruct events from memory. Make sure each record is complete, accurate and valid and let it stand, he advocated.

Although the NCC panel was to examine whether systems really provide the information and safeguards promised, the presentations dealt more with the need for such information and a defense of the safeguards presently in use. The panelists represented the views of organized law enforcement agencies at local, state and federal levels.

Melvin Bockelman, computer systems division manager for the Kansas City Police Department, illustrated the security methods in use there, from guarding unauthorized entry into the computer facility itself to unauthorized access through terminals. He cited careful screening of potential employees as one safeguard.

Bockelman also catalogued the contribution of officers at all points along the law enforcement network, from the patrolman in his terminal-equipped car to the clerk in the juvenile court.

Prudent Precautions

He urged destruction of printouts no longer needed and demonstrated the capability of the Kansas City juvenile records computer to print a warning should unauthorized access to the computerized data be attempted.

The potential of the computer is still "relatively untapped," Bockelman told the audience, "in helping project patterns of criminal behavior and predicting consequences arising from uncorrected societal problems," and he urged its expanded use in years to come.

Bjorklund described the Crime Information Bureau (CIB) in Wisconsin as a "neutral" aid to all law enforcement departments. "Its three subsystems provide an integrated means of managing crime information," he said.

Although its criminal histories have not been computerized because of the privacy issue, possible legislation and cost prob-

(Continued on Page 51)

Codex announces the most advanced family of time division multiplexers available.

The most advanced family of time division multiplexers, that anticipates emerging user needs for worldwide data network configurations and applications, is announced by Codex Corporation. It is the Codex 900 Time Division Multiplexer (TDM).

New efficiency, new economy

The 900 TDM is designed for modular and flexible use in expanding networks requiring more centralized control. At the same time, it offers users a complete range of traditional TDM capabilities, but with greatly increased efficiency and economy.

- **Dynamic channel reconfiguration**
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  Less application fragmentation.
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- **Portable, remote 900 Program / Test panel**
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  Rapid fault isolation.
  More system availability.
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  Increased application mix.
  Improved terminal support.
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Codex is prepared to help integrate your total data transmission network. To know more about the 900 TDM's possibilities for you, see the opposite page.
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Visit the Codex exhibit at the International Communications Association Conference, May 6-8, and at the National Computer Conference, May 6-9.
For your system's sake!

The Codex 900 TDM
Now and to meet your growing needs
Basic Units

The Codex 900 Series is a new family of time division multiplexers (TDM). Its function is to reduce data communication costs by reducing the average number and length of the communication links. Its position in the data communication system is related in figure 1. The 900 accepts information from the user terminals, compresses it into a data stream, transmits it to the computer, and distributes it to the computer's channels. A unique combination of features is offered at minimum cost:

- Computer control of configuration.
- Dynamic reconfiguration from a central site.
- Automatic speed detection.
- Mixed synchronous and asynchronous channels.
- Automatic computer channel assignment.
- Communiciation code transparency.
- Any speed mix ,up to the system's limit.
- 100% efficiency.
- Complete system diagnostics.

The 900 Series is offered in 3 compatible models. For the small application, the 910 supports up to 8 lines, of which 2 may be synchronous. For the large or growing application, the 920 supports up to 64 lines, of which 4 may be synchronous. For the multipoint application, the 930 supports up to 64 lines from up to 4 dispersed locations (see figure 2).

Like 'Swallowing an Elephant'

Traditional Approach Burdensome in Production Facility

By Patrick Ward
Of the CW Staff

CHICAGO—The manufacturing information systems concept has generally been a disappointment, because the systems task involved has proven unique and not amenable to traditional approaches, Earl R. Gomersall, corporate director of information systems and telecommunications for Motoroia, Inc., told an NCC session.

Computers have allowed some firms to decentralize production facilities while maintaining centralized planning and control, Gomersall mentioned.

Computerization has helped manufacturers predict material shortages before they occur and has brought quick and precise movement of information on varied factory activities.

The manufacturing information systems task proved burdensome to systems managers because the manufacturing entity is itself a system of functions and disciplines, whereas other applications, like payroll and finance, tend to be complete functions in themselves.

Delivering the Goods

The end objective of a manufacturing information system is "to ship a quality product to the customer, on time, at a profit," Gomersall explained. But no product can be shipped unless shipping knows the demand for that product. So sales and order-entry systems are prerequisites to a total system.

Similarly, procurement can't supply materials without knowing what's in the product, so it needs a bill-of-materials system. Production control needs its own system; costs can't be assessed without a labor system; and scheduling depends on capacity information.

To avoid "swallowing an elephant," most firms have concentrated either on bill-of-materials data base development or on the sales, billings and backlog data base problem, Gomersall stated.

Computers and Manufacturing

Having completed these applications, systems people have collected data on the product elsewhere in the factory.

But they often learned that more and faster information doesn't necessarily improve productivity, Gomersall commented.

Manufacturing information system designers must consider whether the manager will read the reported information, be able to identify problems from it and then act wisely on those problems.

If the report serves these functions, it is a valuable one, Gomersall commented. But if the action taken to correct an out-of-the-ordinary factory situation affects subsequent manufacturing processes or schedules, more homework on end objectives and systems intent is necessary, he advised.

Manufacturing, which deals with personnel, machines and materials, is a notably imperfect environment, Gomersall observed. That means systems professionals have to ignore the factory problems and guarantee accurate information on what's going on. They should leave it to manufacturing experts to determine appropriate action after evaluating the reports, Gomersall cautioned.

And "since the fallibility of providing only information has already been reviewed, it is small wonder that most total manufacturing information systems produce little tangible return for some pretty tremendous expense," he commented.

A Squeeze Play

It is still possible to wring real gain from a manufacturing information system, Gomersall continued, but it requires doing some things differently:

- It is important to recognize at the outset that most manufacturing complexes are "imperfect entities with continuous and constantly changing data parameters."
- Factory floor data capture is not worth it, unless capturing such data, in itself, will stand the test of cost versus tangible benefit. "Benefits such as adding to the data base, providing expediting information, etc., are not allowed," Gomersall said.
- Recognize that the "interdependency of factory floor variables—men, machines and material—and their short-term unpredictability will prevent meaningful real-time optimizations, even with today's technological tools."
- Try to create as many before-the-fact "duck!" systems as possible.
- Recognize at the start that "most manufacturing complexes cannot be described algebraically. This will prevent developing systems to hypothetical problems."
- And develop goals which accurately describe benefits the automated system is going to deliver.

With a real partnership between the manufacturing and systems people, manufacturing information systems are capable of providing "surprising results" for factory improvement, Gomersall concluded.

Law Enforcers Defend Arrest Recordkeeping

(Continued from Page 50)

lems, the state does have a means of simultaneously searching all existing files automatically—from fingerprints to motor vehicle data—with one front-end inquiry.

A Clean Sweep

"A means for obtaining clean and complete criminal data for input must be assured before automation can be undertaken," he said.

Alan Hamilton, project director, Regional Justice Information Systems (Rejis), described a law enforcement information system maintained by a quasi-governmental group. Serving the five counties of the St. Louis metropolitan area, Rejis is a complete criminal justice information system that also has achieved a position of neutrality.

"Membership by not only law enforcement agencies but also the courts and members of member governments' executive departments assures proper checks and balances," he said.

All models support arbitrary combinations of synchronous channels at 1200, 2000, 2400, 3600, 4800, and/or 7200 bps; asynchronous channels at 75, 110, 134.5, 150, 300, 600, 1200, and/or 1800 bps can be supported simultaneously. The channel combinations are limited only by the 900's high-speed modem. The aggregate throughput rate is 1200, 2400, 3600, 4800, 7200, or 9600 bps.

Configuration Control

The configuration of a 900 Series TDM is determined by a memory in the common logic. Four memories are offered:

- Random-access (RAM): low cost, remotely programmable.
- Read-only (ROM): non-volatile, factory-programmable.
- Dual-ROM (DROM): switchable between 2 configurations.
- Alterable-ROM (AROM): non-volatile, field-programmable.

Where system configuration changes are infrequent, the ROM or dual-ROM can be used at one site and RAMs at other sites. The RAMs are loaded automatically with the correct program at system initialization. By plugging in a new ROM at the central site, one reprograms the entire system. The dual-ROM configurator is used when a system alternates between two configurations: for example, a network may be configured for time-sharing during the day, and remote batch at night.

With a RAM or AROM at the central site, the 900 configuration can be reconfigured quickly in one of two ways:

- From the Codex Program/Test Panel.
- By program transfer from the host CPU.

Either method will automatically cause all 900's and their channel modules to be reprogrammed correctly. The AROM's advantage is its non-volatility; it retains its program in memory, for several years, after a power failure whereas the RAM must be reprogrammed.

Diagnostics

Each channel module displays a full complement of indicators for on-line monitoring. It also contains 4 switches for local loopback, remote loopback, test pattern generation and make busy. End-to-end continuity of the entire transmission path, including control signals, can be checked easily. Similarly, the system's high-speed module displays indicators for on-line monitoring and allows local and remote loopback on the high-speed data stream for rapid fault isolation.

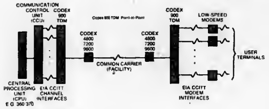
The Codex Test Panel, or combined Program/Test Panel, offers a complete set of system-level monitoring and diagnostic features. Among its capabilities are:

1. Monitor parity errors, framing errors, or overrun errors on any selected channel or on all channels simultaneously; a counter registers error occurrences.
2. Test patterns can be inserted in any selected channel, and checked at different points as they pass through the system.
3. Data, control, or channel characteristics can be monitored continuously on the transmit or receive side of any selected channel.

The Codex Program/Test Panel is attached directly or remotely to the 900 TDM's. It may be located, therefore, as an integral part of the multiplexer package or at the computer or facility test console.

This brief overview is intended merely to suggest the vast scope of configurations and applications possible through the highly modular and flexible Codex 900 TDM product line. More effectively. More efficiently. More economically.

For the full story, call or write Codex today.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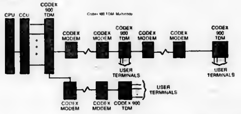

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Standards, Anyone?

CHICAGO—There is work being done to develop new standards for the computer graphics field, Robert Dunn of the U.S. Army Electronics Command, Fort Monmouth, N.J., reported at the NCC session on computer graphics.

He said the ACM Special Interest Group for Graphics (Siggraph) expects to appoint a standards planning committee which will present recommendations for graphic standards at the conference on Computer Graphics and Interactive Computing in Boulder, Colo., July 15-18.

The standards planning committee will consider the topics of 2D/3D line drawings; text and fonts; lines (types, structures, curves); transforms; portability objectives; control (e.g., initialization, start, halt, etc.); and color, according to Siggrapb guidelines.

Other topics to be discussed include image description/object description; input handling and control/interrupts; languages and the environment of concern (e.g., should standards be developed for a subroutine system within a language, a language, or a combination of these); erasures; and passive graphics and interactive graphics.

Issues for the committee to clarify are levels of standardization (upward compatibility, extensibility, growth considerations); ntility orientation (yes, no, to what extent); default conditions and their handling; and real-time considerations.

Properly Run Systems Can Save User Dollars

By Patrick Ward
Of the CW Staff

CHICAGO—The time for explosive growth in computer graphics has been "just around the corner" for 10 years, panel moderator Lawrence Rosler of the Bell Labs technical staff told an NCC session on the problems, perils and promises of computer graphics.

Right now, "if it's properly run it can make money for you," said Gene Marsh, manager of product support for Raytheon Corp., which is using a Computervision system for drafting and design work.

But "computer graphics is being viewed the wrong way," said John B. Macdonald, research leader for graphics computer applications with Western Electric.

The subject "has been viewed as a super technological plaything," he noted. It lacks credibility as a technique because no wide range of users has tested it as a profit-making tool, he said. Computer graphics remains expensive, so it has to be used in a highly profitable manner to win acceptance, Macdonald remarked.

The technique faces user hesitancy, and even a company's accounting system may work against it by not taking account of faster and better design work, noted James D. Foley, assistant professor of computer science at the University of North Carolina.

Human Element

The "human factors" in the man-machine interface are vital, he said. If computer graphics usage is to increase, its advocates will have to add the features users have needed, and change the things that have given people trouble, Foley noted.

Computer Graphics

Inconsideration for human factors, principally software that's difficult to work with, makes graphics systems difficult to use, and therefore less productive and less cost-effective, Foley noted.

Machine independence is another challenge facing computer graphics, Foley remarked. Graphics applications programs are typically written to take into account all of the idiosyncracies of the original graphics terminal used.

Other users have to "reinvent the wheel" since conversion costs can be 50% to 100% over the original development cost, he said.

Marsh said Raytheon went to computer graphics two years ago and decided the technique would work best in the drafting department—which has a $5 million budget—rather than in design or manufacturing.

But Marsh told the panel he now thinks the real impact of computer graphics on drafting and design comes not from using the technique with either function separately, but by combining the two.

Raytheon's system includes 10 Computervision interactive digitizer plotter terminals, a Data General Supernova-based processor and six Tektronix storage CRTs. The latter's screens are too small for the application, Marsh said, adding that prospective users should go to about a 20-in. tube.

Takes 30% Less Time

Marsh said with the automated system, draftsmen can do mechanical assembly drawings in about 30% less time than they can manually.

Mechanical detail drawings also take about 30% less time, and there are similar savings with wiring harness, schematic logic and PC board drawings, he said.

Now, however, Raytheon has design engineers doing work interactively on the system. This common usage by engineers and draftsmen has also allowed Raytheon to use the system as a catalyst.

Eventually, use of computer graphics from the design through the manufacturing stage could save a company like Raytheon one third of a "hypothetical" product's $400,000 development cost, and reduce the project development time by one third as well, Marsh suggested.

Twin Benefits Seen from Technical Advances

By Molly Upton
Of the CW Staff

CHICAGO—The importance of technological advances to the computer graphics field is two-fold: facilitating easier-to-use systems and widening the market potential through a reduction in overall systems cost, thus providing incentive for development of more applications software, panelists at a session on the effect of changing technology in computer graphics agreed.

Luis Villalobos, manager of graphics displays for commercial systems at Hughes Aircraft, noted it is essential to reduce systems to between $2,000 and $3,000 to broaden the market. Price reductions are perhaps even more important than technological ones, he said.

Robert H. Stotz of the University of Southern California stressed the need for units in the $1,500 range.

Sol Sherr, executive vice-president of North Hills Associates, suggested that as component costs come down, the capability will increase, leading to development of systems that are "as digital as possible." He noted that the flat panel matrix systems can accept digital input more directly than other forms of display.

The panelists saw an immense potential market for graphics systems, observing that in five years they will be used in areas ranging from computer-aided design to manufacturing, printing, computer-aided instruction, medicine and management information systems.

Increased use of microprocessors will enable the industry to move away from machine-dependent software, observed James D. Foley, associate professor of computer sciences at the University of North Carolina.

Display units will be able to emulate one another, and by using a microprocessor at the front end, to translate a standard program into instructions for that particular machine.

In addition, microprocessors can take some of the burden from software by making input/output devices look the same to the display unit. This would help make things uniform from the programmer's point of view, he noted.

There is still a need to broaden the graphics market in order to support software development, Foley said.

As the hardware becomes cheaper, designers are encouraged to do more in hardware. This would already be the case if it weren't for the preoccupation with software and the need for flexibility, he said, implying that perhaps firmware provides the answer to the cost versus flexibility dilemma.

Foley urged display processor architects to talk with users and programmers so the end product will be usable and programmable, noting there often seems to be a lack of communication between users and designers.

His vision for satellite systems 10 to 15 years hence calls for the ability to treat satellite graphics in terms of single address space.

The need for standardization in the graphics community was mentioned by a member of the audience, and one reply was that this could be affected either through increased user demand or by getting IBM back into the graphics area.

Stotz observed that a real question is where to put what function. With microprocessors, designers now have an opportunity to put more of the functions of the host processor out into the display unit, such as tracing structured picture, rotating images, zoom and clip, composing new rotating matrices, light pen track and inking.

Another question is how to design protocol acceptance between different displays, he noted.

Villalobos explained that the method of picture generation has an effect on input and data generation, adding that in three to five years or longer, line drawing will be the area in which users will see graphics in practical applications.

Technology has advanced from dot generators to vector generators to curve generators. The areas in which emerging technologies will find significant application are line drawing and curve generation, he said.

Arthur D. Hughes of Hughes Associates noted that operator input/output devices are at the forefront of new technology developments.

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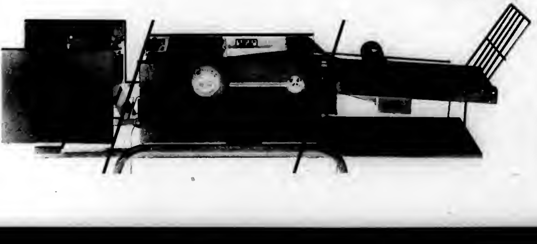

Future Bright for Software Sales

CHICAGO—The sales potential of computer software products has nowhere to go but up, according to three panelists meeting here to discuss prospective trends.

Martin Goetz, vice-president of Applied Data Research, predicted this business, now averaging $400 million to $500 million in annual revenues, will more than double—to $1 billion—by 1976.

International Data Corp. President Pat McGovern buttressed this prediction with another, based on an IDC survey indicating that by 1977 or 1978 users will examine software requirements before even beginning to make hardware choices.

Comments by Larry Welke, president of International Computer Programs, Inc., revealed that software packages rather than custom-built programs will claim the giant share of DP spending—not because "users can't do it better in-house, but because it's rare that a user is willing to invest more time or money to reinvent the wheel when it's available already."

Burton Grad, director of cross-program industry applications for IBM, told attendees that IBM responds to users' needs in its planning and development of new products.

"Smaller users—such as System/3 or DOS users—will continue to buy software," he said. Grad noted, however, a move away from application packages among larger users and a trend toward buying utility programs for data base usage, with an eye toward reducing overall costs rather than applications value.

Facilities Draw Universal Praise

'Disappointing' Attendance Garners Mixed Reaction From NCC Exhibitors

By a CW Staff Writer

CHICAGO—With total NCC attendance falling short of most expectations here last week, exhibitors displayed an ambivalent attitude toward the show with praise for the facilities and a mixed reaction to the audience.

While attendance figures were particularly low in the area of exhibits-only registration, most exhibitors cited good "quality" of the attendees to make up for the lack of total bodies.

And while total attendance did not live up to many expectations, the show itself was larger than any in the past four years, with 250 firms occupying 816 booths—a total surpassed only at the 1969 Fall Joint Computer Conference in Las Vegas.

With action hot and heavy between the mini- versus microcomputer exhibitors at the meeting, both sides cited contacts with system designers at the show as a good sign.

And the many makers of miniperipherals in attendance also indicated they were seeing good quality people or "buying influences" for their areas.

However, several of the largest exhibitors in terms of booth size hinted that while the quality of people they were seeing was good, they would also have liked to see more of them.

Hot and Heavy

The major OEM action on the floor involved marketing confrontations among the mini makers themselves—since almost all the major firms were there—and between the mini makers as a whole and the upstart microcomputer firms which were more in evidence at this NCC than ever before.

Several marketing men said this new interest on the part of the micro makers—generally semiconductor houses—may mean a showdown between the mini makers and the microcomputer firms, as the micro producers are apparently going after many of the accounts long held by the mini companies.

Miniperipherals, generally a sidelight at past computer conferences, came into their own this year, accounting for many of the new-product announcements made during the show.

This fact also illustrates another trend evidenced on the exhibit floor: a lack of startling innovation and more emphasis on filling gaps in present product lines to meet the needs of both OEMs and end users.

Almost all of the new products for the OEM side involved what some may view as rather mundane products—boards, tape readers, disk systems, etc.—but they all served to round out present lines of many of the firms.

"Most of the people in the business realize that you have to have a complete line in your area of specialty in order to serve your customer needs best," one exhibitor said. "And," he added, "you can tell that a lot of people here are filling holes they have found in their product lines."

The trend of the OEM exhibits was clearly to the smaller systems with not only the micro and mini exhibitors making a splash, but also several other firms offering updates of older products in reconfigured designs primarily developed to take up less space.

Spangle Warns Luncheon Group:

MIS Success on Manufacturers' Shoulders

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—Operational management information systems (MIS)—an unrealized dream in the 1960s—can become a reality in this decade if manufacturers provide users with the equipment they need to implement such systems, Clarence W. Spangle, executive vice-president at Honeywell, said here last week.

Spangle, speaking at an NCC industry luncheon, said manufacturers would have to provide new equipment in such areas as mass storage and data communications and increased reliability of mainframes for the MIS dream to become a reality.

But while the industry bears the responsibility for providing such systems tools, users have a responsibility for implementing them, and thus must participate with the companies in failures as well as successes.

The failure of MIS in the 1960s reflected and "came to symbolize the failure of the application of data processing systems, not just the development of ill-conceived management information systems, but to applications in general," Spangle stated.

The "route to a valid management information system lies in the implementation of operational systems and integrating them with accounting and control systems" already in place, he said.

But there were very few operational systems in existence in the 1960s, which led to the failure of the MIS idea, he indicated, because users simply didn't have a large enough application base for MIS.

The Unknown Entity

The other problem, he said, is that top level managers "can't define their information requirements and they change constantly," and the need for information that cannot be anticipated dooms such systems.

Operational systems, he noted, do not just report what has happened in a firm, but permit the managers to have control over events while they are happening—and these systems should be the basis for future MIS implementation.

However, he warned, "this step will take years to accomplish and it will have to be tied together with the already effective accounting and control systems before the hierarchy of management information systems can be established and effectively used."

The industry has a large stake in the success of these systems, he indicated, because they can provide a great deal of the future growth in the industry.

To aid in the growth of these systems, the industry needs to provide data base-oriented systems, lower-cost communications, low-cost data storage and improved computer reliability, Spangle said.

In the area of data bases, he said the industry needs to help in standardizing data base languages so that data base systems will be transferable between users.

But since most data bases are distributed, there is also a need for improvement in data communications facilities, he said, in view of both price and reliability.

"Then too," he said, "operational systems require large amounts of data easily accessible. . . . This means large amounts of mass storage at reduced access times."

To meet this user need, Spangle predicted that the industry would double the present disk capacity of 200M bytes spindle within the next two to three years. "Density likewise will be increased from 1,000 bit/in. 10 years ago to 5,000 bit/in. this year, and will double again in two years," he said.

Clarence W. Spangle

Spangle forecast that there would be improved access times in the next few years and that "new technologies may provide an intermediate storage level between main memories and disk that will decrease access times even further."

The development of operational systems will "require a nearly continuous availability of the computer system.

"This requirement implies high reliability of the main frame, the operating systems, the software application systems, the peripheral subsystems, the network, the network subsystems and the terminals.

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From Add-On Memory Exhibitors:

370s Form Future Market Base

By Nancy French
Of the CW Staff

CHICAGO—For most add-on memory manufacturers showing their wares at NCC here last week, the IBM 370 users are still customers of the future.

With the exception of Cambridge Memories, all manufacturers interviewed are still doing the bulk of their IBM business with 360 users or with OEM manufacturers, especially in the minicomputer lines.

Standard Memories' "Smart Boxes" are simply not compatible with the 370 since they are core memories rather than the faster semiconductor type, according to Fred Genovese, regional sales manager for end-user systems.

"The 370 market will be big," Jack Devine, vice-president for sales, said, "but it's got to mature. For us it depends on how many [systems] IBM has sold. We're probably going to be in that market around 1975 or 1976," he said.

Right now, Standard's concentration is still on the 360 users of the models 22, 30, 40 and 50 plus the Model 44, Devine added.

Fully 90% of Standard's products are sold to OEM manufacturers. The 10% of memories going to end users go to university laboratories, for example, which do not depend on manufacturers for software, he said.

Because Digital Equipment Corp.'s artificially high prices have created a market for plug-in add-on memories, said Welter Waldron, Standard's eastern regional manager for OEM products, OEM sales will comprise 60% to 70% of Standard's business, he predicted.

Standard is also considering add-ons for IBM System/3 computers and is developing an increased stable of interfaces for other minis such as Hewlett-Packard and Interdata.

For Ampex Corp., OEM business also makes up about 60% of the business.

Ampex manufactures add-ons compatible with the IBM 360/50 and up, IBM 370, Decsystem-10 and the Univac 1100 and 400 series.

"As a whole, the 360 is not as strong as it was a couple of years ago—but it is still a market," said Kent Mueller, midwestarn regional manager.

Rather than add-ons per se, "Ampex is growing more aggressive in other peripheral equipment such as disk storage, especially with its IBM 3330 and IBM double-density replacements," he said.

Fabri-Tek, Inc., too, earns only a small portion of its income from sales to IBM users. Its line of memory systems is made up of core memory rather than semiconductor, and its present thrust is in the field of minicomputer add-ons. Fabri-Tek's models are plug-in compatible with the Hewlett-Packard 2114 and 2100 systems, DEC's PDP-8, PDP-12 and PDP-11, and Data General's Nova 1200 minicomputer. Fabri-Tek, too, makes the bulk of its sales in the OEM market.

Since Fabri-Tek's acquisition of Data Recall, the company can save users from 20% to 50% over DEC or HP, Gerald Larsen, vice-president for marketing, computer systems, said.

Of all the firms interviewed, Cambridge Memories seemed to claim the largest percentage of its sales to IBM 370 users. At present, according to George Neuman, "IBM 370 users are a growing market making up 90% of our business." Neuman described the 360 market as "deteriorating" with the number of CPUs "out there shrinking."

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Focus on Regional Problems May Slow International Cooperation

By Molly Upton
Of the CW Staff

CHICAGO—International cooperation in the DP field is growing, but not at the rate one would expect, according to H. Zemanek, president of the International Federation for Information Processing (Ifip).

Speaking at a session on computer developments and applications outside the U.S., Zemanek said in spite of the growth of DP and the range of applications, international activities are not keeping pace.

Although Ifip membership has grown to 35 countries since its first big international conference in 1959, some counter developments such as the trends from global to regional and from general to specific appear to hinder the development of widespread exchanges of information, he said.

Zemanek acknowledged there are factors which make cooperation on a global scale now different from the situation 15 years ago.

For instance, the DP world then was somewhat smaller, and DP people tended to be top level scientists with access to travel. Now the range of nations with DP needs, problems and developments has grown tremendously as has the number of people in the field, many of whom do not have extensive travel budgets. Traveling to all five continents is not as easy as one would expect, he commented.

Fifteen years ago there was a close relationship between theory, development and applications, whereas these are somewhat separate areas now, increasing the communications problem.

The trend now is to work on problems of regional rather than global concern, he said, and regional cooperation is growing in importance.

Global View

During the session, speakers from France, Brazil and Japan gave some idea of the contrasts in stages of DP development throughout the world.

Brazil is currently undergoing very rapid DP expansion, said E. Landim, president of Systems SA and head of the Brazilian national computer society, Sucesu Nacionall.

Most of the computer population is centered in two areas, Rio and Sau Paulo, and machines are most commonly used in batch mode for clerical functions, although banks and government are entering into on-line use.

In 1972 there were 11,000 people in the DP industry, whereas by 1973 there were 16,000 and by the end of 1974 DP personnel are projected to reach 25,000 in number, he said.

The number of computers installed doubles every two years, and the value of installations totalled $87 million in 1973.

This figure is expected to reach $105 million in 1974 and $218 million by 1977, or about a 40% growth in 1973 and 1974, Landim added.

Francois Peleyras, peripheral product manager of Compagnie Internationale pour l'Informatique, said the number of computers installed in France is six times as large as the 1,603 figure in 1966.

A Global View

By 1978, the computer population is projected to reach 22,000 from the 1973 base of 9,905, he noted.

Small systems, priced from $10,000 to $50,000 and averaging $20,000 is the fastest growing category, he added.

Japan, however, is "on the threshold of the information age," midway between the industrial society and the information society, said Kaoru Ando, managing director of Fujitsu Ltd.

Ando likened Japan's efforts to become an information-oriented society by the year 2,000 to the Apollo project in the U.S.

Japan is currently between the second and third periods of a master plan. For the second stage, from 1955 to 1980, the focus is on gross national product, whereas from 1970 to 1990, it is gross national welfare, with the focus on the needs of society.

In the fourth stage, 1980 to 2000, the focus is referred to as gross national satisfaction, with the goal being the self-realization of the individual, he said.

Because Japan has scarce national resources, it is making extensive efforts to develop knowledge-intensive industries as opposed to material-intensive industries, he added.

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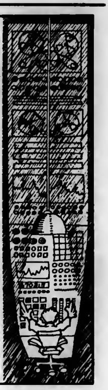

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Government DP in State of Flux

CHICAGO—A panel of high-level government DP experts discussed some of the important changes occurring within government agencies as a result of Executive Order 11717. The order was issued in May 1973 to implement parts of the 1965 Brooks Bill.

The most significant change was the realignment of functions within the agencies responsible for computer acquisition and standardization within the government.

The responsibility for issuing policies governing acquisition and management of ADP gear was reassigned from the Office of Management and Budget (OMB) to a new Office of Federal Management Policy (OFMP) in the General Services Administration.

OMB's responsibility for approving standards for federal use has in turn been turned over to the Department of Commerce.

George Wakefield, ADP manager, OFMP, outlined an in-depth strategy study of major trends and issues affecting the government's future course in the acquisition, use and management of computer systems and services for the purpose of recommending new and/or revised policies and actions.

"Since 1966 the Federal Government has gone from second-generation to fourth-generation ADP systems," he said. "Plug-to-plug compatible elements of ADP systems have emerged. Low-cost minicomputers have been introduced and network linkages of geographically separated computer sites have come about," he noted.

The ADP Strategy Study will address three issues: the public/private issue, centralization/decentralization, and organization and management.

Gordon Yamada, director, management systems, OFMP, said the study will ask such questions as, "To what extent and under what circumstances should the government rely on private industry for computational service, data communication and facilities management?" and "What kinds of applications because of 'mission needs' such as security, privacy and continuity of service should be provided in-house regardless of economics?"

Concerning centralization versus decentralization, the study will attempt to learn how state-of-the-art technology affects the economics of centralization and decentralization and to what extent dedicated systems should be utilized in lieu of consolidated computing service centers.

The study has been contracted to Decision and Designs and will cost $197,000, according to Wakefield.

Yamada addresses the audience while panelists Reedes, Gentile, Renninger, Hunter and Wakefield listen.

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Vendor Competition Heating Up

Mini vs Micro—Differences Hard to Keep Straight

By Molly Upton
Of the CW Staff

CHICAGO—With minicomputer companies going down to the board level, and microcomputer houses offering more in the way of support tools to their OEM customers, the old divisional lines between the two product areas are blurring, if not disappearing.

Although several surveys quote semiconductor houses as saying they don't envision their microcomputers competing with the minicomputer market, some minimakers interviewed at NCC admitted the two industry sectors are moving closer together—and vying for the same markets.

As Steve Bowers, director of marketing for General Automation, Inc., said, "It's going to be an interesting battle."

He sees a confrontation in the microprocessor area, with the semi houses increasing their capabilities and the mini makers making more of an effort in the stripped down, board area.

The semi houses have the chip technology and the minis have the know-how with software and peripherals, he said.

General Automation has come out with a 32K board for use in its new LSI/16S, 16-bit minicomputer.

However, the firm is basically oriented toward the end-user market, and the goal "for our micro [unit] is to build it into a complete system," he said.

"We don't want to be known as a memory manufacturer, but as a minicomputer company," he added.

General Automation, he noted, carefully selects the OEM markets it wishes to enter, such as machine tool, for sales at the component level.

Bowers

Wayne B. Gartin, product manager for Hewlett-Packard's 21MX mini, said he doesn't see a threat from the micro area because it addresses a different market than the minis, but he admitted that the minis and the micros will meet someplace.

Within the next year to 18 months the microprocessors will "become extremely competitive" in timing and performance, he said.

"By then HP will be able to address a wide range of mini prices, but won't address the microcomputer market as it is currently defined," he added.

CW Inquiring Photographer

Gartin

He drew the line between micros and minis at 4K of memory, noting that HP's efforts are principally in the systems area.

Steven Gaal, marketing manager for computation products for Data General, said microcomputers and minis are "mutually exclusive," noting the micros suffer from basic lack of performance capability.

Their speeds are around 20 microseconds compared with 2 microseconds for minis, he explained.

The twain "might meet," but he wouldn't guess when.

The entry cost of using microcomputers is substantial in terms of integration with OEM hardware," he noted.

Carter

Gaal

Jennings

Lack of program development, high level languages and technical support are among the drawbacks of using micros, he noted. One would need to use 300 to 400 machines a year to make using microprocessors worthwhile, he estimated.

Microdata Corp. has gone down to the board level with the introduction of its 1K MOS memory CPU which sells for $895. Gary Hudson, western regional sales manager, said he sees chip houses offering some software and interface capability, but stopping short of full systems capability.

Gene P. Carter, director of marketing for National Semiconductor, said he doesn't think the micros are a threat to the mini market, as micros are serving a market that the mini makers haven't wanted.

However, he noted, more and more of the smaller mini makers are entering the lower end of the market on the board level.

More Micros Than Minis

"The mini makers are recognizing we intend to sell more micros than they sold minis in 10 years," he said.

"They are recognizing the opportunity in this marketplace," he added, projecting that this year the industry would sell between $100 million to $125 million in memory, logic processors and associated gear.

LSI components alone should have a market of about $30 million this year, he noted.

National is not sitting still watching the mini makers bring out products on the board level. Rather, it is launching into the support of the OEM customer with its IMP-16P prototype system for use in prototype debugging, developing instruction sets and programming Proms.

Carter doesn't foresee minis and micro makers competing head on at the chip level.

The mini makers, he noted, buy their chips from the semi houses.

Rather, the competition will come at the card and system level, he said.

The NCC marks the first time National Semiconductor has exhibited in a computer-related show, he noted.

Cover All Areas

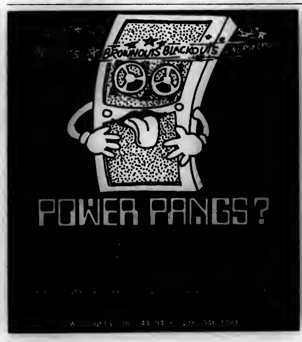
The strategy at Texas Instruments appears to be to cover both markets. Richard Jennings, director of computer marketing, said TI is developing products across the board, although he would not confirm TI plans to compete at the microprocessor level.

There is some overlap between minis and micros in the $1,500 to $2,500 range, and the real clash now is with processors on boards, he said. DEC and Data General both offer boards, he noted, hinting that TI will also join them.

"Without question the chip houses are moving up and taking business from OEMs by providing packages and chassis," he observed.

While the two are meeting in the OEM arena now, he said he doesn't think chip makers have the resources to cater to the end-user market.

TI introduced a 24K board with 4K MOS chips that sells in single quantities for $5,000, with single bit error correction designed for use in the firm's new 960B minicomputer.



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Exhibitors Send Top Men

One of the Biggest Engineering Feats of 1974

CW Photo Feature
By V. J. Farmer

CHICAGO—Even with the largest exhibit for an Afips-sponsored conference in almost five years, exhibitors here reported few real problems in setting up the exhibition. However, there was a smattering of griping about union-related problems in the convention hall.

McCormick Place, most exhibitors agreed, is one of the most efficient—as weli as beautiful—convention centers in the country and definitely a cut above the facilities used by Afips in the past for national or joint conferences.

The major complaint voiced by exhibitors, who began setting up for the show five days before the opening, involved labor problems, particularly with the electricians—an obviously necessary ingredient for a computer exhibit.

In one case, during the setup of the IBM 370/155 computer displayed by Control Data Corp., CDC technicians and union electricians argued for almost half a day over who would be responsible for wiring the system.

Finally the CDC people handed the electricians a manual describing the wiring and hookup job, but after a brief look at the documentation, the electricians decided there were better things to do elsewhere in the hall.

And the unions had definite rules about who could do what. For example in order to set up a teletypewriter, one exhibitor had to hire a rigger to take it out of the crate and a carpenter to attach it to the base—at $32 per hour each.

Jack Cleveland adjusts Versatec printer.

Systems design engineer Neil Endslay inspects circuit board from Mohawk 4401c data collection terminal.

Comtal engineer John F. Harrell pinpoints problem in tape reader.

Don Milek, manager of application engineering, connects oscilloscope to Remex cassette reader.

"If we just could move this diode . . ." Larry Pyle, Shugart director of engineering and Paul Currin, manager of customer service, plan an engineering change.

Two engineers set up a Fabri-Tek add-on memory.

Charles Storr, Courier engineer warms up a CRT terminal.

Programmer William Franks checks a program on the Inforex 1303.

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System Controls Convention Center

By a CW Staff Writer

CHICAGO—While IBM was showing a building control system on the floor of McCormick Place here last week, a Honeywell system located in the bowels of the building was actually controlling the security and the environment for the convention hall.

The system is based on a DDP-516 system connected to five Data General Nova systems spread throughout the building.

On the security side, the system monitors all doors in the building and all are electrically operated from a central control station.

If any one tampers with any of the doors after they have been locked, an audible alarm is sounded and the information on location and time is printed out on a teletypewriter.

The system is also tied into infrared monitors in all important areas of the hall to detect the presence of anyone off-limits.

This part of the system also provides a count of people in meeting rooms—and even in the bathrooms—so the security force can tell whether there are any overcrowded situations.

The monitors in the bathrooms are used primarily to alert the janitorial crews to heavily-used facilities.

Besides the people counter, there is also a monitor for vehicles in and around the building. The monitor alerts the security force of any illegal parking or other infractions that might block fire equipment if it were needed.

The environmental system completely controls a huge power plant that consists of three steam generators capable of producing 40,000 lb/hr and an air conditioning plant that has an 8,550-ton capacity.

It also automatically operates 92 major fan systems in the building itself, 15 main exhaust fans and 76 other fans for other areas such as the taxi pickup area to keep down exhaust fumes.

This system not only controls the generators and air conditioning equipment to maintain the temperature of the building, but it also prints out a daily status report of the use of the various pieces of equipment and keeps an historical log for maintenance and updating purposes.

The unit has a separate fire alarm system—an important consideration here since the old McCormick Place burned to the ground several years ago.

This unit is fed from five different types of sensors and automatically sounds an alarm in the security office as well as sending the signal automatically to the fire department.

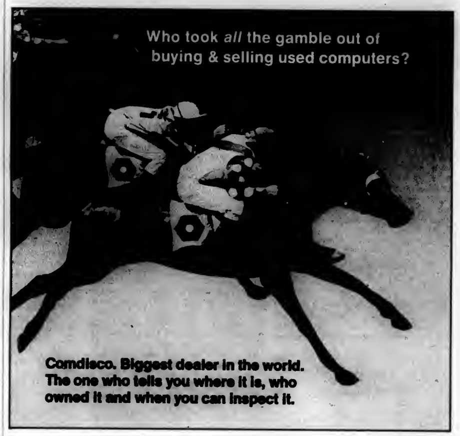
The information is immediately displayed on four panels—one in the security office and the other three at entrances firemen would use to enter the building.

CW Photo by M. Upton

Security officer Bruce Beema keeps close watch on people traffic flow in McCormick Place here through a system of infrared dectectors feeding data to a Honeywell DDP-516.

GOOD NEWS

KENNEDY DATA SYSTEMS, INC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OEMs Show Wide Range of Products, Many Concentrate on 'Line Filling'

CHICAGO—A wide range of new peripherals highlighted the OEM product announcements here at NCC last week.

But most of the product action on the floor was concerned with filling in existing product lines and there was little completely new technology on display at the largest computer industry exhibit in years.

Okidata clearly showed this "fill-in" trend with the introduction of four products ranging from a large fixed-head disk to a panel display and two printers.

The head-per-track disk comes at the high end of the Okidata line and is available with capacities up to 36M bits.

Available in configurations of 2,400-, 3,600- and 4,800 rev/min, the unit can have an access time of 9.25 msec at the highest rotation speed.

The capacity ranges from 9.6M to 36M bits and data tracks of 64 to 256 can be employed using 16-track head modules.

Prices can be as low as $7,500 in OEM quantities, and a full 36M-bit system is available at under $11,000, the firm said.

The two printers introduced include a medium-speed unit and one at the low end.

The Okidata LP500, equipped with a 64-char. set, prints at 500 line/min and is priced under $7,500 in OEM quantities, while the CP110 character printer operates at 110 char./sec using the standard 64-char. Ascii set. It is priced at under $900 in OEM quantities for a complete system.

The Okidata Alphanumeric Panel Display shows a 5 by 7 dot matrix in red or green in either two rows of 32 characters each, four rows of 16 to 32 characters each, or eight rows of 32 characters each.

Designed for such applications as point-of-sale systems, the firm said, the typical price for a complete 64-char. system would be $323 complete with drivers, character generator and memory in lots of 100.

The firm is at 111 Gaither Drive, Moorestown, N.J. 08057.

Other OEMers Participate

There were other OEM products on display.

California Data Processors (Cal Data) introduced a microprogrammable family of minicomputers which the firm said can give the OEM volume user a second source CPU replacement.

The CDP-XI/35 and CDP-XI/I can emulate many mini- and midicomputers, the firm said. Both systems are based on the CDP-X1/00 microprocessor which has an 850-nsec cycle time and 16K words expandable to 128K. The microprocessor alone sells for under $4,000 in moderate quantities.

The CDP-Xl/35 is software- and I/O-compatible with the PDP-11/05 through PDP-11/40 machines. The CDP-X1/35 with 32K core sells for under $13,000 in quantities of 25.

Cal Data is at 2019 S. Ritchey St., Santa Ana, Calif. 92705.

Decision Data Computer Corp. introduced its first 80-column card reader. The Model 8025, which operates at a speed of 300 card/min, offers a 600-card hopper and stacker capacity.

The table-top unit sells for $1,875 in quantity. Delivery is 90 to 120 days from Decision Data at 100 Witmer Road, Horsham, Pa. 19044.

Qume Corp.'s models Q30 and Q45 printers use the "daisy wheel" changeable print element. The models Q30 and Q45, running at 30- and 45 char./sec respectively, were shown on simulated applications in communications terminals, word processing systems, business data processing and graphics plotting.

Prices range from $975 to over $2,800, depending on quantities and options. Qume is quoting 120-day delivery from 26203 Production Ave., Hayward, Calif. 94545.

National Semiconductor said it plans to add several new products to its line of 16- and 8-bit chips, cards and prototyping systems. By the end of May it will have a Prom Programmer Option for about $750.

The IMP-4, a 4-bit version of National's IMP-8 and IMP-16 microprocessors, is scheduled for June. The volume price will be under $80, the firm said.

In July, it will unveil a field alterable control element (Face) which will offer IMP microprocessor users a writeable control store.

Early in 1975, National plans to introduce a high-speed, 8-bit microprocessor on one chip.

The firm is at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Tally Corp. came out with two photoelectric tape readers, the R-2050 which reads up to 250 char./sec, and the Model R-2000 which reads up to 300 char./sec continuously.

Both units use a standard light bulb and handle 5-, 7- or 8-level tape and are DTL- and TTL-compatible.

The R-2050 is priced at $275 without electronics and $375 with electronics. Single quanity prices for the Model R 2000 start at $546, the firm said from 855 Sansome St., San Francisco, Calif. 94111.

A planar core memory system from Dataproducts Corp. provides 16K-word by 18-bit capacity for minicomputers, digital controllers and other applications which require large memories.

Designated the Store/1618, the 3-D, 3-wire, planar memory system features 700-nsec cycle time and 275-nsec access time. In OEM quantities, the completely tested and assembled system sells for less than semiconductor memory components, the firm said.

Core arrays and all electronics are housed in a module that measures 12 in. by 14 in. by 0.85 in. and consists of two circuit boards.

Dataproducts is headquartered at 6219 DeSoto Ave., Woodland Hills, Calif. 91364.

Remex showed its paper tape emulator tied into General Automation's Office Management System.

Remex also did some "line filling" at the show introducing a floppy disk drive (RFD 7400), a desk-top perforator/reader (RAB 6375), a high-speed photoelectric reader (RR 6500) and a paper tape emulator cassette system (RCS 1300).

The floppy disk system is IBM-compatible with 3.2M bits of storage capacity and a 250K bit/sec data transfer rate. The unit which has a 6-msec access time track-to-track is priced at $750.

The RAB 6375 perforator/reader is a stand-alone unit that operates at 75 char./sec with 8- and 6-level tapes in the perforation mode and at 300 char./sec in the reader mode. It is priced at $2,435 in single units.

The RR 6500 photoelectric reader can operate at up to 500 char./sec synchronous and 300 char./sec asynchronous. It is priced at $895.

The tape emulator is a magnetic cassette system that is hardware and software compatible with most existing punched tape equipment. Capable of storing 160,000 characters and operating at 300 char./sec asynchronous, the unit is available from the firm at 1733 Alton St., Santa Ana, Calif. 92705.

General Automation, Inc. announced a large scale integrated (LSI) circuit version of its SPC-16 mini, the LSI-16, and a 32K word semiconductor micromemory packaged on a single board.

The LSI-16 uses silicon-on-sapphire technology.

The arithmetic logic unit chip contains the equivalent of 8,000 transistors in a 0.2 sq. in. chip.

The LSI-16 is compatible with the SPC-16 and when used with the new 32K memory board offers an average cycle time of 1.8 microseconds. The LSI-16 is priced at less than $1,000 as a board-level system in quantities of 200.

A 32K minicomputer system including chassis, power supply, console and six I/O slots starts at $9,450 in a minimum quantity of five.

General Automation, Inc. is at 1055 S. East St., Anaheim, Calif. 92805.

True Data Corp. introduced a family of low-price optical data readers that processes data at speeds ranging from 200 to 1,000 card/min. Every model can read either punched or marked 80-column cards, or punched and marked cards intermixed. Data output is 12-bit parallel or character serial.

A 200- or 400 card/min reader is priced at $1,000; the 300- to 800 card/min reader is $1,100 and the 1,000 card/min reader is priced at $1,200 from the firm at 2701 S. Halladay St., Santa Ana, Calif.

Digital Equipment Corp. announced three enhanced minicomputers at lower prices than their predecessors.

The new Model PDP-8/A features a 1K random access memory (RAM) and is made up of a CPU module with addressing capability up to 32K. Optional memory includes RAM, read-only memory (ROM) and programmable ROM.

The unit, which sells for $1,117 in quantities of 100 features a cycle time of 1.5 microseconds.

Two new PDP-11 minis announced by the firm—the PDP-11/05S and the PDP-11/35S—have 16K of sense core memory. The PDP-11/05S is priced at $7,495 compared with the previous price of $10,800. The PDP-11/35S is priced at $11,965.

Both units have direct memory access and the 11/35S has space in the chassis for up to 32K of additional core memory.

DEC said the use of sense core memory allowed the reductions.

Chicago Chuckles

Robert C. Gammill, a panelist on artificial intelligence and a researcher with the Rand Corp., explained his fascination with Tic-Tac-Toe-type games, after which he hastened to add that the work was done as a hobby, "without government grants."

On the other hand, several high-school students at the Science Fair demonstrated various chess-playing programs, developed in school and on their own time.

The youngsters also had minicomputers and communications devices on display—all "Invented" or improved by precollege individuals.

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CW Staff Storms Chicago Show

By a CW Staff Writer

CHICAGO—If you tried to call us last week, we weren't home.

A 19-member platoon of *Computerworld* staffers was here for the National Computer Conference, producing over 50,000 words of copy and taking almost 700 photographs for this issue.

Working out of an elegant press room, hotel rooms and a printing plant just south of the Loop, the staff managed to maintain a slight veneer of sanity as they produced the equivalent of a medium-size novel between Monday night and Friday morning.

The week was comprised of missed meals, missed dates, and occasionally, missing persons and cars for the staff, who consistently worked 16-hour-plus days.

We're still wondering how one staff member managed to have a car stolen by two prostitutes—he wasn't in it at the time—and even though it was later recovered, it was only after a bellboy pursued the thieves and received a bottle of Canadian Club cracked over his head for his troubles.

And another staff man spent a great deal of time as a seamstress in the press room in exchange for back rubs from Afips staffers.

Even with the hard work, surly hotel managers who didn't understand harried journalists, tried feet and blurred vision, the experience was fun and, hopefully, entertaining and informative for CW readers.

Molly Upton reads some copy.

Hank Fling puts a page together.

Donna Turnbull and Cindy Kintzer process photo page.

Drake Lundell works on a story.

Pat McGovern evaluates a brain replacement.

Vic Farmer warms up a 360.

Leslie Flanagan selects photos.

Toni Wiseman gets a close look at a board.

Pat Ward gets a feel for a terminal.

Judy Kramer looks over type galleys.

Edie Holmes reads over a story.

Ed Bride checks a fact.

Leete Doty signs off a page.

Don Leavitt takes notes.

Nancy French studies the agenda.

Herb Grosch gets a feel for a mini.

Kate MacDonald edits copy.

Ron Frank tests a terminal.

Computers Can Personalize Society, deButts Claims

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO—Computer systems "can exert an enormously civilizing influence on the management of our affairs" by freeing people to deal with others on a more personal basis than they have in the past, John D. deButts, chairman of the board of AT&T, told a luncheon audience at NCC here last week.

By taking over many mundane tasks and offering a greater range of services than was possible before, computer systems are giving us "the opportunity to personalize our society and its institutions in a way hitherto beyond our scope," deButts said.

While the computer revolution has neither had the dire consequences nor met the utopian promise predicted for it in the early days of the business, it has already occurred, he asserted.

"So quietly, though, so utterly without the catastrophic disruptions so many prophets thought would accompany it, that most people go about their lives and work as if today's world were the same world they grew up in," he added.

"But the fact of the matter is that you and your colleagues in the computer arts have changed our world. Today your systems of hardware and software affect—for the most part benignly—how nearly all of us carry out our daily tasks and influence the way we see the world around us."

The fact that the computer revolution has occurred quietly "is in large measure a tribute to the good sense of your profession, the poise and patience of a calling that knows itself to be in league with the future."

The pervasiveness of the computer revolution can be seen clearly by the operation of the Bell System, deButts said.

This system, he went on, uses 2,311 computers, 811 in the large, general-purpose classification and 1,500 in the minicomputer classification—and the firm employs over 25,000 people in occupations directly relating to data processing.

The systems allow the company "to know vastly more about ourselves and the very large machine we run than we have ever known before," he said, noting this has had "a profound effect on the efficiency with which we utilize its capacity."

The firm, he said, has developed what is known as the "business information system," the "brightest promise" of which "is the freedom of managers to manage, of engineers to engineer and—the greatest freedom of all—the freedom of people to deal with people as people.

"Far from dehumanizing our operation, its aim is to scale it to the unique requirements of each individual we serve," he stated.

While computer systems will never be able to replace people in making final decisions, he noted that information technology can serve "as a very powerful adjunct to the decision-making process."

But deButts warned, there are "questions that remain that we neglect at our peril," noting particularly the problem -of insuring personal privacy "from malicious or inadvertent misuse of the enormous and uncommonly retentive memory your technology affords."

He added, however, that he was confident that answers would be found for these problems, since there seems to be "a greater sensitivity to these matters and a stronger determination to resolve them" in the computer industry than anywhere else.

'Gremlins' Strike Control Data Booth

By a CW Staff Writer

CHICAGO—Although Control Data Corp. had a guard for its booth, which undoubtedly had the most equipment in it, there were some mysterious occurrences last Tuesday night at NCC here.

The air conditioning unit was shut off, so disk drives wouldn't run in the morning, and the printer controller wouldn't function because the power supply was out. Everything was back up by 11 a.m.

"It seemed that someone turned off everything they could figure out how to turn off," one CDCer said.

The CDC booth has an IBM 370/155 with 2M bytes of AMS memory running four programs concurrently under OS/MVT.

Data General, also in the same general sector of the hall, reported its CRT dials were turned down, so there were no displays on the tubes when they were turned on in the morning.

Other booths surveyed randomly reported no problems, except that Sunday night Comdisco lost a Selectric element off the operator console of its displayed 360/40.

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MANAGER of COURSE DEVELOPMENT

We are currently seeking an innovative individual capable of technically guiding our course development group. You will have the opportunity to build this department from the ground floor up.

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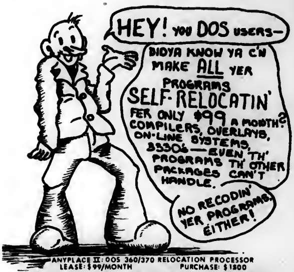
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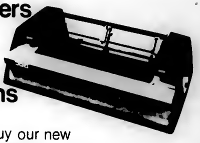

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Business Up at 4 Communications Firms

Four communications equipment makers reported increased earnings and revenues for recent fiscal periods. Comten, Inc. showed record earnings and revenues for the year ended Dec. 31, while Wiltek, Inc., Codex Corp. and Milgo Electronic Corp. all revealed a rise in first-quarter results.

Comten completed its second year of profitable operations with earnings of $631,700 or 30 cents a share, including a $302,000 tax credit, compared with $219,200 or 11 cents a share in the year-ago period, when there was a $108,000 tax credit.

Revenues rose 41% to $9.2 million from $6.5 million.

President Donald J. Herman attributed the improved results to a substantial increase in product acceptance, improved product margins, cost control measures and an increasing installed lease base.

Wiltek Earnings Triple

Wiltek's first-quarter earnings more than tripled from those of the year-ago period while revenues rose 90%.

Earnings reached $142,000 or 10 cents a share compared with $38,000 or 3 cents a share in the 1973 period. Revenues rose to $3.7 million from nearly $2 million.

Sales expansion accompanied by a lower rate of growth in overhead and service costs contributed to the increased earnings, Wiltek President R.J. Amman said.

Increased service revenue offset the costs of expanding the service organization and net service cost for the quarter remained at about the same level as a year ago, he said.

At Codex Corp., earnings in the first quarter ended Dec. 31 more than doubled to $818,000 or 56 cents a share, including a $386,000 tax credit, compared with $370,000 or 26 cents a share in 1972, when there was a $171,000 tax credit.

Revenues rose to $3.2 million from $1.4 million in the year-ago period.

Milgo's first-quarter earnings rose to $837,000 or 53 cents a share compared with $704,000 or 44 cents a share in the year-ago period.

Revenues climbed to almost $7 million from $4.8 million.

During the quarter, Milgo's modem sales totaled $4,260 while modem leases were $2,639.

Earlier, Milgo reported that for the second consecutive year sales and earnings increased 50%.

For the year ended Sept. 30, earnings totaled $3.1 million or $1.98 a share compared with $2.1 million or $1.32 a share in the year-ago period.

Revenues rose to $21.9 million from $13.8 million in the 1972 period.

Overseas Markets Boost Interdata

OCEANPORT, N.J. – Higher shipment levels and expansion of international markets helped boost Interdata, Inc.'s first-quarter earnings 67% over those of a year ago, while revenues rose 74%.

President Daniel Sinnott noted the firm's Model 7/16 mini has received rapid market acceptance and Interdata is "well ahead of our shipment forecast for the product."

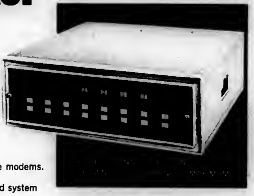
In the three months ended March 29, earnings rose to $470,300 or 22 cents a share from $272,500 or 13 cents a share in the year-ago period.

The 1974 figure includes a $24,400 credit from foreign tax benefits, while there was a $5,100 credit in the 1973 period.

Revenues jumped to $6.7 million from $3.8 million in the year-ago quarter.

Backlog at the end of the quarter totaled $9.2 million compared with $5.4 million a year ago.

frequency division multiplexer



FEATURES . . .

INDICATORS: Multi-colored display panel provides indication of four control and two data functions.

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VOICE-PLUS-DATA: Simultaneous voice channel with four data channels.

OPTIONS: Many other optional features.

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ComData Corporation DCMA

Earnings Reports

INTERDYNE
Three Months Ended Jan. 31

	1974	1973
Shr Ernd	$.03	$(.03)
Revenue	553,000	513,000
Earnings	43,000	(46,000)

DATATAB
Year Ended Dec. 31

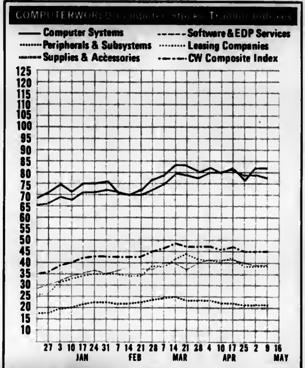
	1973	1972
Shr Ernd	$(.03)	$.21
Revenue	5,085,705	5,248,519
Earnings	(23,325)	159,000
3 Mo Shr	(.13)	.02
Revenue	1,252,503	1,325,247
Earnings	(100,573)	12,883

TYCOM
Year Ended Sept. 30

	1973	1972
Shr Ernd	$.38	$(.16)
Revenue	2,380,000	780,000
Tax Cred	97,900	.....
Earnings	209,469	(83,689)

THE COMPUTER EXCHANGE
Six Months Ended Dec. 31

	1973	1972
Shr Ernd	$.01	$.11
Revenue	3,052,434	3,747,118
Tax Cred	3,597	40,560
Earnings	12,070	98,041



QUANTOR
Six Months Ended Jan. 31

	1974	1973
Revenue	$3,294,000	$1,537,000
Earnings	87,000	(657,000)

ODEC
Six Months Ended Dec. 31

	1973	1972
Shr Ernd	$.04	$.02
Revenue	4,024,857	2,378,438
Earnings	65,191	43,041

DELTA DATA SYSTEMS
Three Months Ended Dec. 31

	1973	1972
Shr Ernd	$.04	$.02
Revenue	1,231,252	659,358
Tax Cred	58,452	5,312
Earnings	127,452	28,148
9 Mo Shr	.17	.02
Revenue	3,042,783	1,797,055
Tax Cred	159,647	5,972
Earnings	345,545	27,145

KERONIX
Six Months Ended Nov. 30

	1973	1972
Shr Ernd	$.17	$.20
Revenue	1,455,004	1,230,388
Earnings	132,393	143,144

GENERAL DATACOMM
Three Months Ended Dec. 31

	1973	1972
Shr Ernd	$.12	$.10
Revenue	2,343,805	1,503,932
Tax Cred	85,253	67,900
Earnings	177,810	141,388

MENTOR
Three Months Ended Dec. 31

	1973	1972
Shr Ernd	$.03	$.02
Revenue	1,371,893	1,077,385
Tax Cred	.....	8,000
Earnings	50,125	35,653
6 Mo Shr	.06	.03
Revenue	2,685,010	2,099,240
Tax Cred	.....	9,000
Earnings	112,216	39,995

OPF
Three Months Ended Feb. 28

	1974	a1973
Shr ERnd	$.14	.....
Revenue	8,048,000	$8,367,000
Tax Cred	283,000	11,000
Earnings	567,000	23,000
9 Mo Shr	.26	.04
Revenue	24,027,000	25,945,000
Tax Cred	525,000	86,000
Earnings	1,051,000	173,000

a-Restated.

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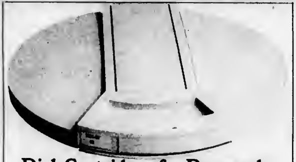

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Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1973-74 RANGE (1)	CLOSE MAY 10 1974	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	49-126	107 3/8	+4 5/8	+4.5
N	COLLINS RADIO	16- 26	24 3/4	0	0.0
O	COMPUTER AUTOMATION	5- 20	12	+ 1/4	+2.1
N	CONTROL DATA CORP	30- 62	31	- 3/4	-2.3
N	DATA GENERAL CORP	28- 49	33 1/2	+ 1/2	+1.5
O	DATAPOINT CORP	10- 21	14 1/4	+1 1/2	+11.7
O	DIGITAL COMM CONTROL	2- 6	3 1/2	- 1/4	-6.6
N	DIGITAL EQUIPMENT	73-121	114 5/8	-1 1/2	-1.2
N	ELECTRONIC ASSOC.	2- 9	2 3/8	0	0.0
A	ELECTRONIC ENGINEER.	6- 14	9 1/2	- 1/4	-2.5
N	FOXBORO	23- 48	38 7/8	- 1/8	-0.3
O	GENERAL AUTOMATION	22- 55	39 3/4	+1 1/4	+3.2
O	GRI COMPUTER CORP	1- 3	1 3/8	- 1/8	-8.3
N	HEWLETT-PACKARD CO	70- 88	89	+4 5/8	+5.4
N	HONEYWELL INC	88-138	79 3/4	+2 1/4	+2.9
N	IBM	222-340	230 1/2	+1 1/8	+0.4
O	INTERDATA INC	7- 22	19 7/8	+ 1/8	+0.6
O	MICRODATA CORP	2- 10	3 5/8	0	0.0
N	NCR	27- 46	36 5/8	- 5/8	-1.6
N	RAYTHEON CO	22- 39	35 1/4	0	0.0
N	SINGER CO	32- 74	32 1/2	+ 5/8	+1.9
N	SPERRY RAND	36- 56	39 5/8	+ 1/8	+0.3
A	SYSTEMS ENG. LABS	1- 8	1 7/8	- 1/8	-6.2
N	TEXAS INSTRUMENTS	83-130	113 1/4	+6 3/8	+5.9
O	ULTIMACC SYSTEMS INC	1- 11	1 1/2	+ 1/8	+9.0
N	VARIAN ASSOCIATES	10- 20	10 1/8	- 1/4	-2.4
N	WANG LABS.	13- 34	12 5/8	-1 1/8	-8.1
N	XEROX CORP	106-189	118	+4 3/4	+4.2

LEASING COMPANIES

EXCH		1973-74 RANGE (1)	CLOSE MAY 10 1974	WEEK NET CHNGE	WEEK PCT CHNGE
A	BOOTHE COMPUTER	1- 5	1 1/8	0	0.0
O	BRESNAHAN COMP.	1- 2	2 1/8	0	0.0
O	COMDISCO INC	4- 17	3 1/2	- 3/8	-9.6
A	COMMERCE GROUP CORP	3- 6	5	0	0.0
O	COMPUTER EXCHANGE	1- 1	1/4	0	0.0
A	COMPUTER INVSTRS GRP	2- 8	2	0	0.0
O	COMP. INSTALLATIONS	1- 2	1 1/8	0	0.0
M	DATRONIC RENTAL	1- 3	1 3/8	- 1/4	-15.3
A	DCL INC	0- 1	1/2	0	0.0
N	DPF INC	3- 9	3 5/8	0	0.0
O	EDP RESOURCES	1- 3	3 1/4	0	0.0
A	GRANITE MGT	2- 6	1 7/8	- 1/8	-6.2
A	GREYHOUND COMPUTER	3- 6	3 5/8	- 1/8	-3.3
A	ITEL	4- 12	5	0	0.0
N	LEASCO CORP	8- 18	10 1/8	+ 1/8	+1.2
O	LEASPAC CORP	1- 8	1 1/4	0	0.0
O	LECTRO MGT INC	1- 2	1/2	0	0.0
O	RRB INC	3- 15	4	+ 3/8	+10.3
A	PIONEER TEX CORP	3- 10	3 1/4	- 1/8	-3.7
A	ROCKWOOD COMPUTER	1- 3	3/4	0	0.0
N	U.S. LEASING	15- 36	15 1/2	+ 3/8	+2.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1973-74 RANGE (1)	CLOSE MAY 10 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED CORP TECH	1- 2	1 1/8	0	0.0
A	APPLIED DATA RES.	2- 4	2 5/8	- 1/4	-8.6
O	APPLIED LOGIC	1- 3	3/8	0	0.0
N	AUTOMATIC DATA PROC	31- 94	32 7/8	-7 1/8	-17.8
O	BRANDON APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	3- 9	4	+ 1/2	+14.2
O	COMPUTER DIMENSIONS	1- 5	2	0	0.0
O	COMPUTER HORIZONS	1- 6	2 1/4	-1 1/4	-35.7
O	COMPUTER NETWORK	1- 5	1 3/8	0	0.0
N	COMPUTER SCIENCES	2- 6	2 3/4	- 1/4	-8.3
O	COMPUTER TASK GROUP	1- 2	1/2	+ 1/8	+33.3
O	COMPUTER TECHNOLOGY	1- 3	1/2	0	0.0
O	COMPUTER USAGE	3- 9	2 7/8	- 1/8	-4.1
O	COMPESS	1- 2	3/8	0	0.0
O	COMSHARE	2- 8	2 3/4	0	0.0
M	CORDURA CORP	2- 15	2 3/8	0	0.0
O	DATATAB	1- 4	1 1/4	- 1/8	-9.0
A	ELECT COMP PROG	1- 2	1/4	0	0.0
N	ELECTRONIC DATA SYS.	12- 56	16 1/8	+ 5/8	+4.0
O	INFORATIONAL INC	1- 2	1/2	0	0.0
O	INFORMATICS	2- 7	6 3/4	0	0.0
O	I.D.A. DATA CORP	1- 1	3/8	0	0.0
O	IPS COMPUTER MARKET.	1- 5	7/8	0	0.8
O	KEANE ASSOCIATES	2- 5	3 1/2	0	0.0
O	KEYDATA CORP	4- 12	4 1/4	0	0.0
O	LOGICON	2- 7	3 3/8	- 1/4	-6.8
A	MANAGEMENT DATA	1- 5	1 7/8	+ 1/2	+36.3
O	NATIONAL CSS INC	18- 42	24 1/2	- 1/2	-2.0
O	NATIONAL COMPUTER CO	1- 1	3/8	0	0.0
O	NATIONAL INFO SRVCS	1- 2	1/8	0	0.0
P	ON LINE SYSTEMS INC	12- 28	30 3/8	+1 7/8	+6.5
N	PLANNING RESEARCH	2- 7	2 3/4	- 1/4	-8.3
O	PROGRAMMING METHODS	17- 25	17	0	0.0
O	PROGRAMMING & SYS	1- 1	7/8	- 1/8	-12.5
O	RAPIDATA INC	2- 24	2 1/2	+ 1/4	+11.1
O	SCIENTIFIC COMPUTERS	1- 3	7/8	0	0.0
O	SIMPLICITY COMPUTER	1- 4	1	0	0.0
O	TCC INC	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 13	10 3/4	0	0.0
O	UNITED DATA CENTER	3- 6	3 1/4	0	0.0
A	UPS SYSTEMS	2- 8	2 7/8	- 1/4	-8.0
N	WYLY CORP	3- 11	3 1/2	- 1/8	-3.4

PERIPHERALS & SUBSYSTEMS

EXCH		1973-74 RANGE (1)	CLOSE MAY 10 1974	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	7- 34	7	- 3/4	-9.6
O	ADVANCED MEMORY SYS	4- 23	3 3/4	0	0.0
N	AMPEX CORP	3- 7	3 5/8	- 1/8	-3.3
O	ANDERSON JACOBSON	2- 6	2 3/4	0	0.0
O	BEEHIVE MEDICAL ELEC	3- 10	2 1/2	-1	-28.5
A	BOLT,BERANEK & NEW	6- 12	7	- 3/8	-5.0
N	BUNKER-RAMO	6- 18	6 1/4	0	0.0
A	CALCOMP	5- 16	10 3/8	- 1/8	-1.1
O	CAMBRIDGE MEMORIES	8- 17	11 1/4	+ 5/8	+5.8
O	CENTRONICS DATA COMP	13- 38	23	+2 1/2	+12.1
O	CODEX CORP	8- 19	12	0	0.0
O	COGNITRONICS	1- 3	1 1/4	+ 1/8	+11.1
O	COMPUTER COMMUN.	1- 4	3/4	+ 1/8	+20.0
A	COMPUTER EQUIPMENT	1- 3	1 5/8	0	0.0
O	COMPUTER MACHINERY	4- 13	4 1/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 6	1 1/8	0	0.0
N	CONRAC CORP	13- 32	19 7/8	+ 3/8	+1.9
O	DATA ACCESS SYSTEMS	1- 3	1 7/8	- 1/8	-6.2
O	DATA 100	9- 19	10 5/8	+ 3/8	+3.6
A	DATA PRODUCTS CORP	2- 5	3 5/8	0	0.0
O	DATA RECOGNITION	1- 3	1/2	0	0.0
O	DATA TECHNOLOGY	1- 5	3 1/4	- 1/8	-3.7
O	DECISION DATA COMPUT	6- 40	6 7/8	- 5/8	-8.5
O	DELTA DATA SYSTEMS	1- 1	7/8	+ 1/8	+16.6
O	DI/AN CONTROLS	1- 4	1 1/4	0	0.0
N	ELECTRONIC M & M	3- 6	3	0	0.0
O	FABRI-TEK	2- 5	2 1/2	0	0.0
O	GENERAL COMPUTER SYS	3- 9	2 3/4	0	0.0
N	GENERAL ELECTRIC	51- 76	50 7/8	-2 1/8	-4.0
N	HAZELTINE CORP	4- 9	4 3/4	+ 1/8	+2.7
O	INFOREX INC	2- 23	2 3/8	- 3/8	-13.6
O	INFORMATION DISPLAYS	1- 2	3/8	0	0.0
O	INFORMATION INTL INC	8- 15	10	+ 1/4	+2.5
A	LUNDY ELECTRONICS	3- 9	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/4	0	0.0
N	MEMOREX	2- 19	4 1/2	- 1/8	-2.7
A	MILGO ELECTRONICS	12- 28	12 1/2	- 1/4	-1.9
N	MOHAWK DATA SCI	2- 13	2 3/4	- 1/4	-8.3
O	ODEC COMPUTER SYST.	2- 6	1 3/4	0	0.0
O	OPTICAL SCANNING	2- 8	3 3/8	- 1/4	-6.8
O	PERTEC CORP	3- 8	3	- 3/8	-11.1
O	PHOTON	3- 7	3 3/4	0	0.0
A	POTTER INSTRUMENT	2- 9	3 3/8	0	0.0
O	PRECISION INST.	2- 6	1 3/4	0	0.0
O	QUANTOR CORP	4- 10	5 1/2	- 3/4	-12.0
O	RECOGNITION EQUIP	2- 8	3 5/8	- 1/4	-6.4
N	SANDERS ASSOCIATES	4- 18	4 1/8	- 5/8	-13.1
O	SCAN DATA	1- 6	1 5/8	- 1/4	-13.3
O	STORAGE TECHNOLOGY	11- 34	14	+2	+16.6
O	SYCOR INC	7- 20	8 1/2	+ 1/2	+6.2
O	TALLY CORP.	2- 14	3 5/8	0	0.0
O	TEC INC	5- 9	4 1/2	- 1/2	-10.0
N	TEKTRONIX INC	30- 55	43 5/8	+1 1/8	+2.6
N	TELEX	3- 8	2 3/4	+ 1/8	+4.7
O	WANGCO INC	7- 13	11 3/4	- 1/4	-2.0
O	WILTEK INC	5- 18	5 1/4	- 1/4	-4.5

SUPPLIES & ACCESSORIES

EXCH		1973-74 RANGE (1)	CLOSE MAY 10 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 9	5 1/2	- 1/4	-4.3
A	BARRY WRIGHT	5- 13	6 1/8	- 1/4	-3.9
O	CYBERMATICS INC	1- 3	1 1/4	0	0.0
A	DATA DOCUMENTS	17- 50	47 3/4	+1 1/4	+2.6
O	DUPLEX PRODUCTS INC	6- 10	8 5/8	+ 1/8	+1.4
N	ENNIS BUS. FORMS	5- 8	6	0	0.0
O	GRAHAM MAGNETICS	7- 20	8 1/4	- 1/2	-5.7
O	GRAPHIC CONTROLS	7- 12	9 3/4	- 1/4	-2.5
N	3M COMPANY	69- 91	73 3/8	+1 3/4	+2.4
O	MOORE CORP LTD	48- 65	52 1/4	+1 1/4	+2.4
N	NASHUA CORP	32- 58	32 3/4	-1 1/8	-3.3
O	REYNOLDS & REYNOLD	24- 51	25	+ 1/2	+2.0
O	STANDARD REGISTER	11- 28	15	+ 1/2	+3.4
O	TAB PRODUCTS CO	7- 23	6 1/2	-1 1/2	-18.7
N	UARCO	15- 23	20 3/8	- 5/8	-2.9
A	WABASH MAGNETICS	5- 8	5 5/8	0	0.0
N	WALLACE BUS FORMS	14- 28	20 7/8	+ 1/8	+0.6

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